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Productive Occupations *for* Industrial Veterans

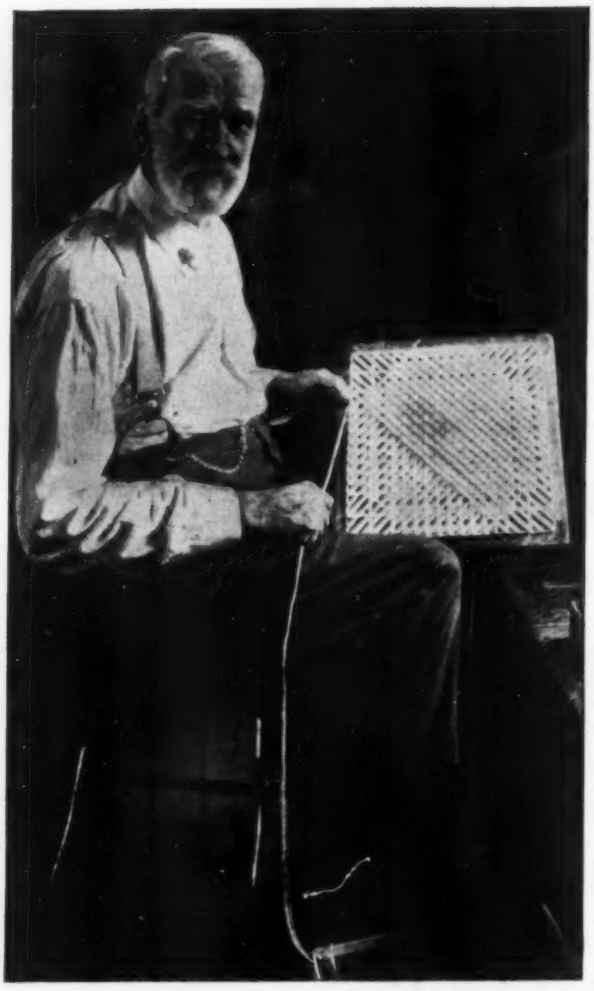
WHAT becomes of the worker who reaches the retirement age?

THE AMERICAN worker is a reasonable being who figures things out for himself. He is not afraid to look at a problem and can reach his own conclusions. And that is exactly what he has done by giving his hearty endorsement to retirement plans designed to remedy the industrial ills centering in the superannuated employee. Closely related to industry's old age problem and pensions is the question of providing productive occupations for veteran workers.

It would be rash to make any flat and concrete assertion regarding the reaction of American workers, as a body, with respect to any problem affecting them; they have quite as divergent views as any other section of the American public, of which they form so great a part. But it may safely be said, that at least two widespread theories exist regarding the retirement of veteran employees when they may have passed the point of greatest efficiency. It is not the intention to set up one against the other, nor to endorse either.

Many industrial organizations favor a program which includes the payment of adjusted pensions to superannuated employees in order to supplement lower wages earned in positions of less skill and responsibility than were formerly held. This transfer method of retaining veteran employees in an organization is far from objectionable in the eyes of many workers. In fact, it has the approval of one of the groups into which American workers are divided on the old age retirement question.

Employees in this group, which some students of the old age situation, pensions, unemployment, and kindred economic problems, believe to be a very large, consider retirement, even with a pension of substantial size, with



distinct aversion. They decidedly approve of pensions. but they would like to postpone full retirement until they are positively unable physically and otherwise to work longer. The explanation of their desire to hang on to their jobs is probably due to the fact that their main interest in life has been centered in the plant or office. Even in the higher classifications, it is often the case that, while retirement on pension makes a strong appeal a few years before the retirement age has been reached, when it actually does arrive, retirement, even with a substantial pension guaranteed, is met with both distaste and resentment. Veterans with this viewpoint welcome the opportunity to continue at work, at their old jobs or in less responsible ones, at lower wages, which may or may not be supplemented by allowances withdrawn from a pension fund. Somehow, some way, they want it arranged so they can keep on working with their old friends.

Opposed to this group, however, is another, perhaps equally as large. Employees in this group look forward to retirement on pension with the delight that can only be had by men and women who have interests outside work, who have resources within themselves, that will bring them pleasure and contentment. For such employees, retirement is a boon awaited with keen delight. It is such employees as these who endorse pensions from the bottom of their hearts and consider their weekly or monthly contributions to a pension fund as an effective method of saving toward a future competence which eventually will permit them to retire from business or industry, with their economic future made secure. It is employees such as these who have proved one of the greatest factors in causing the success of contributory insured pension schemes, which many economists believe comprise the best methods yet devised of establishing just, safe, and workable pension programs.

It should not be difficult to understand the point of view of employees in this group. There is nothing strange about their belief that, instead of being kept at work after reaching a normal retirement age, the best thing for them and their employers would be full retirement on pension. Furthermore, few employees of this sort are going to idle their time away without making some effort to add a little to their incomes. This contention is borne out by an interesting account of what one group of retired workers is doing, which appeared in an article published last December in the *Baltimore Gas and Electric News*. It was entitled "Visiting Our Veterans," and in part said:

"During the early fall it was my privilege to visit those of our retired employees living in or near the city, bearing to each a message of continued interest and good wishes from the management.

"About one-fourth of them are still actively employed on a variety of occupations. Several as night watchmen, doormen at movie theaters, as salesmen, clerks, and vault guardians at banks. One is a packer at a local department store. A storekeeper, a sexton, an information clerk at an insurance office are also among them. Those of you who drive cars will be glad to know that you have an associate in the night telephone clerk at the office of the Commissioner of Motor Vehicles.

"Two, whose health makes it necessary for them to live at sanatoriums, are actively employed there, one as a night watchman and one in charge of the flower beds.

"Most of those who are not actively employed are by no means idle, their time being fully occupied in raising chickens, flowers, or dogs; in farming or in the upkeep of their property.

"One, who is raising berries, makes deliveries to his customers with the same pony and cart that carried him for so many years to and from Front Street."

From this account of what the employees retired from one organization are doing, it seems fair to conclude that many other workers retired on pension are not spending their last days in unproductive idleness.

It is well enough to talk about productive occupations for industrial veterans. Business and industry are correct in assuming that many of the older employees are eager to keep at work until they draw their last breath, and would be miserable if they could not to do. There are others, however, who would like to have the opportunity to take it easy during their last few years. These veteran workers would manage to find contentment in full retirement, even if forced to supplement their pensions by the little additional income they could earn by doing odd jobs of some sort. It isn't the job itself that many of the veteran workers would miss, so much as the wages that go with the job. With a pension providing the necessities of life, industry and the general public need concern themselves little about occupations for them.

Pensions meet the old age requirements of both groups of employees, and of the country itself, for we have become more than ever before a nation of employees. They include the most powerful industrial and business leaders, just as they do the workers in the lowest wage

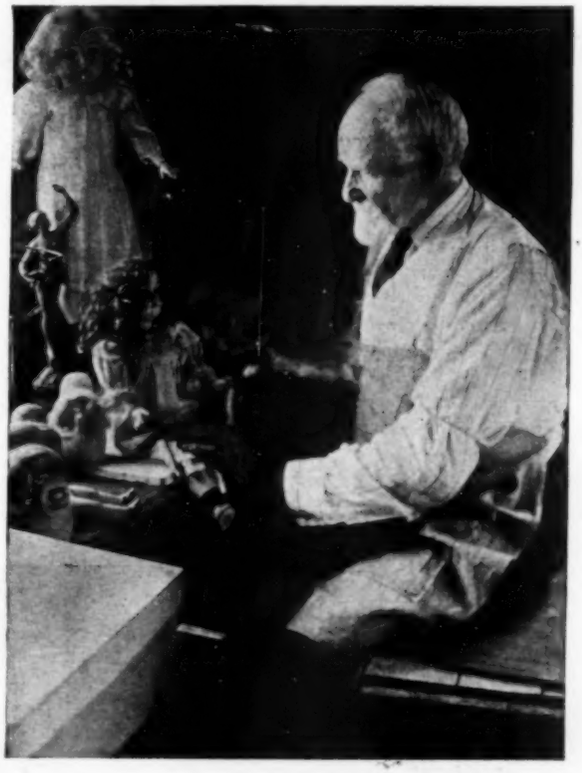
and salary ranges. It isn't at all unlikely that this very fact has had much to do with industry's comparatively recent attitude toward industrial pensions. The manager of a concern himself may have worked up to his present position from the ranks. For this reason he is likely to understand the problems and the viewpoint of the less financially successful employees.

Industry, perhaps largely because of this change in leadership from individual ownership to management by employees of high executive rank, has come to feel a certain obligation for the continued welfare of veteran workers. And many of these leaders have come to believe that this obligation can best be met through some form of pension.

The practice of one machinery company in this respect is to pay its older employees half pay, whether they work or not. If they work for more than half of the time, however, the company pays them what they earn.

Another machinery company puts its employees on pension when they get to an age which renders them unsafe for their occupation. When this is done, however, it is with the understanding that the pensioned employee can supplement his income elsewhere if he sees fit. Most of the workers, on retiring, however, have been found, in this instance, to be doing little but gardening and house work.

In a shoe company, if an older employee can earn his full salary he is put on some suitable work at a salary which covers this work, and he is given a supplementary



sum in the form of a pension, not to exceed $5 a week.

In a study made by one of the large insurance companies on the question of transferring superannuated employees, a number of positions which could be used for this purpose was enumerated. Without attempting to give a complete list, some of the occupations noted were assembler, cashier, checker, cleaner, door tender, gatekeeper, guard, information clerk, janitor, messenger, porter, sweeper, watchman, and weigher.

The same study gives another indication of how industrial organizations are meeting the problem of placing superannuated employees in productive occupations by establishing salvage departments. The study says:

"In several instances, companies place superannuated and disabled employees in departments engaged in the salvage of material and equipment. In a study of thirty-six plans for the American Management Association, twenty-one companies had salvage departments with a personnel selected wholly for their fitness in the work. In only three concerns did the salvage department take care of older employees no longer fitted for their former productive jobs."

With respect to these exceptions to the general rule of not using salvage departments for superannuated employees, the study says that one of these concerns employed at the time the study was made approximately five men "in this capacity whose duty it is to separate materials, save parts of value, and dispose of scrap. These employees are partially incapacitated and must have to their credit fifteen or more years of service. They are paid on a day work basis, and the rate is set without consideration of previous earnings."

In a detailed and extensive study for the American Management Association on the "Pre-Retirement Disposition of Old Employees," Bennet F. Schauffler, after describing methods established by various concerns along these lines, makes the following enlightening statement:

"Although it is comparatively easy, while you can look on the old employee as merely an 'economic unit' to generalize about not letting him interfere with efficiency, hold up production, or increase costs, action becomes more difficult when this unit is visualized in the person of old Hank Peterson who has worked long and faithfully out in department 36, has a wife and five children as well as his chronic arthritis, and can't get by on a pension. Given a few 'Hank Petersons' to worry about, any humane executive will wish for some intelligent application of methods listed above or of better methods yet to be evolved."

What a clear picture that is of the problems confronting the humane executive, the high-up employee who has gone through the mill himself, the man, perhaps, who has known some "Hank Peterson" from a time long before he himself acquired the mantle of high authority! And the "Hank Petersons" are by no means rare in industry.

Slow But Not So Sure

THE old adage that clerks are either "slow but sure" or rapid and inaccurate was shown to be a fallacy by findings presented by Dr. J. L. O'Rourke, Director of Research, U. S. Civil Service Commission, before the first session of the American Management Conference in Cleveland recently. He declared that, as a group, clerks who naturally work at a rapid rate make far fewer errors than are made by their more deliberate fellow workers. A comparison of the speed and accuracy of general clerical workers showed that those working most rapidly were able to perform typical clerical tasks at five and a half times the rate of the slowest clerks, yet the "slow but sure" group made seven times as many errors.

New Murray Unit Finishes and Trims 900 Bodies a Day

By C. W. AVERY
President, The Murray Corporation of America

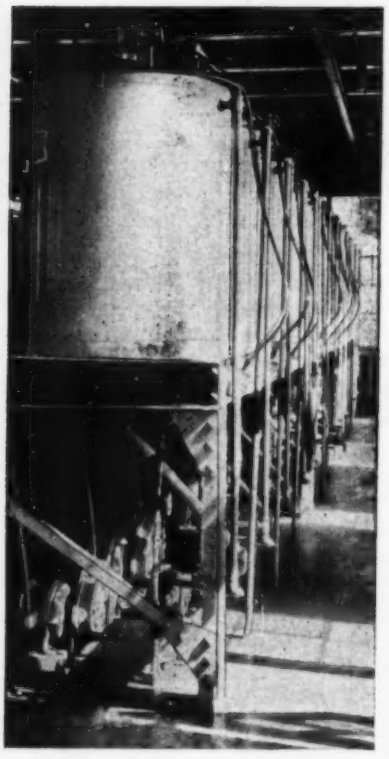


Fig. 1—Row of lacquer mixing tanks with agitators. The pumps keep lacquer circulating in pipe lines leading to spray booths. There is a separate tank for each color

AS EXPLAINED in a preceding article, the unit of the Murray Corporation of America's plant dealt with here, was designed especially for continuous automobile body production at the rate of 100 complete jobs per hour. Our layout is such that the product in process moves almost constantly from the freight cars in which the raw materials are received, through the fabricating and assembly operations to platforms where the finished product is delivered and shipped. A minimum of space is devoted to temporary storage of parts needed to take up slack when for any reason the various departments cannot function at precisely the same rate.

Having assembled the composite wood and metal structure forming the body proper, as outlined in the foregoing article, it remains to apply a finish and to trim the interior. Although quite simple, these operations require skill and careful training to produce the desired results. Handwork is necessary in most operations, but machines are used wherever feasible and special fixtures facilitate the work of trimming. Trim sub-assemblies all are made at sewing tables beside conveyor lines and need only be tacked or otherwise fastened in place when applied to the body shell.

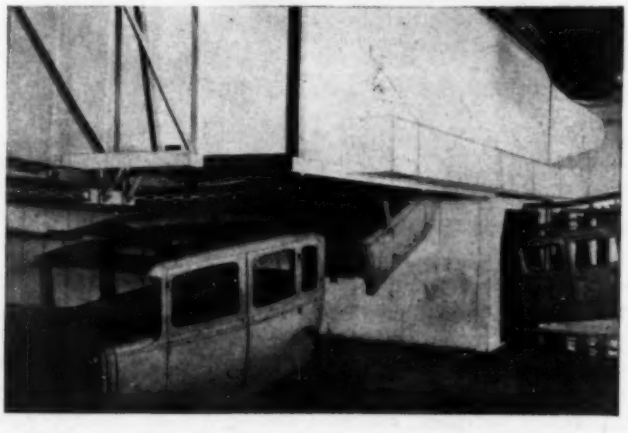
To minimize the danger of fire and also to make the atmosphere non-injurious to workers, 85 exhaust fan outlets lead from the various spray booths to a point well above the roof. Since the air thus exhausted must be replaced, there are located on the roof nine pent-houses each containing a large fan and a steam heating unit. Pure air drawn in by these fans is heated and discharged into ducts leading to the departments on the sixth and seventh floors.

Lacquers used for finishing coats are mixed in a separate pent-house on the roof of the plant. One of the rows of mixing tanks and pumps in this room is shown in Fig. 1. Lacquer is delivered to the roof of the building in drums and is transferred to mixing tanks as needed. Motor-driven agitators keep the mixture stirred up at all times and the pumps keep the lacquer in motion through the pipe lines leading to the various spray booths. For each color of lacquer to be applied, there is a special tank and pump with pipe lines leading to each booth in which this color is to be sprayed.

To conserve floor space and to minimize distance of travel, the bodies are carried on chain conveyors in the finishing department on the sixth and seventh floors throughout the various painting, drying, and rubbing operations. Certain of the ovens are located at ceiling height and other ovens are of the double-deck type. One of the latter is shown in Fig. 2, with the body in the background entering the lower deck of the oven and the bodies in the foreground coming down from the upper deck. Between these two drying operations the bodies pass through an intermediate painting operation.

The "body in white," received ready assembled by the

Fig. 2—One of the double-deck ovens in which two separate drying operations take place



The second of two articles on the Murray plant. The first appeared on page 397, Vol. 72, No. 10.

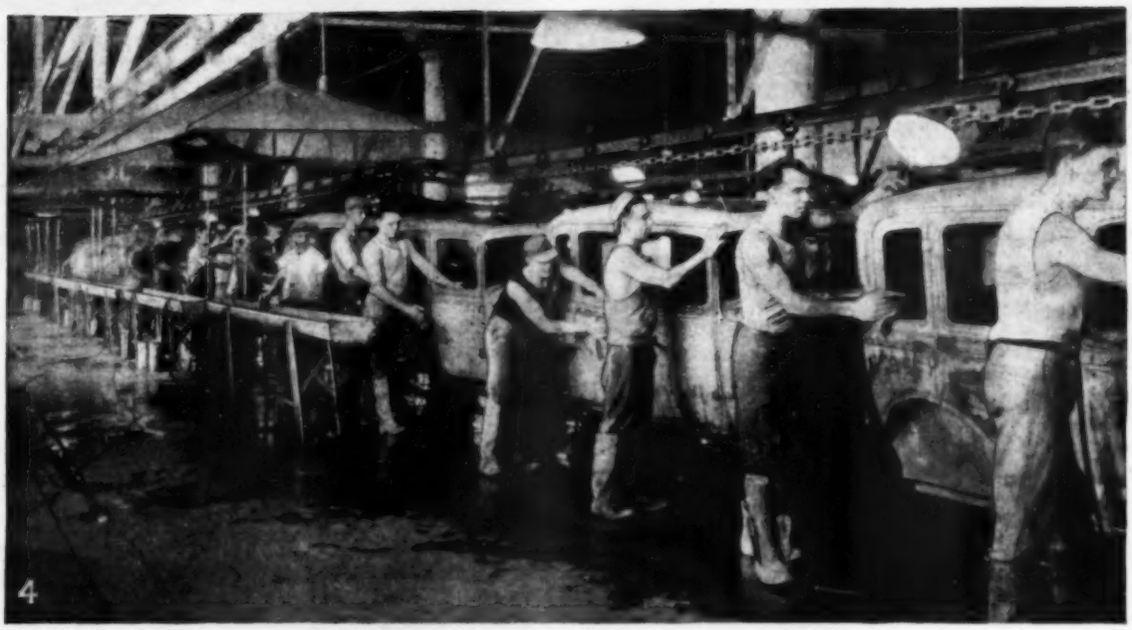


Fig. 3—Putty glazing operation which follows the application and drying of the primer. Fig. 4—Water-sanding or wet "scuffing" takes place after the three surfacer coats have been applied and dried. Fig. 5—Application of the top deck is done while the body moves on a slat conveyor between elevated platforms on which the workmen stand. Fig. 6—Conveyor lines on which seat cushions are assembled. The springs are compressed automatically while the upholstery is tacked in.

finishing department, first is rubbed down with Deoxidine to remove rust and grease, and then rinsed with hot water. When clean, the body is rubbed dry and all moisture wiped from moldings. The bodies are suspended from an overhead chain conveyor both for convenience in handling and to keep the chemicals and water away from wearing parts of the conveyor. After cleaning the body receives, inside and out, a spray coat of primer, which is dried two hours at 200 deg. Fahrenheit.

In the putty glaze operation, shown in Fig. 3, the glaze is applied with wide-blade putty knives to fill up slightly uneven places. The body then receives three coats of surfacer applied with spray guns in well-ventilated booths. A drying operation at 200 deg. F. follows each application of surfacer, the drying time being 5 minutes for the first two coats and 65 minutes for the third coat.

After the bodies have passed through the third surfacer spray booth and the succeeding drying operation they are water-sanded or "scuffed." This operation, shown in Fig. 4, is performed with very fine sandpaper dipped in water. The water is obtained from troughs placed at each side of the conveyor line. This rubbing removes rough spots and smooths the surface for succeeding coats.

Following the water-sanding operation, the bodies are spot-primed to cover spots rubbed bare in sanding. They then are dried, re-sanded, inspected and unloaded onto a platform-type conveyor that carries them into an elevator for delivery to the seventh floor.

Lacquering

On the seventh floor the lacquer coats are applied. Lacquering is done as the bodies are carried forward by an over-head chain conveyor. Bare spots are sprayed first and the body is scuffed and cleaned. The ground coat is sprayed on and dried and succeeding spray coats of lacquer are applied. Three operations call for the application of paper to the body to cover certain portions while other exposed portions, notably the superstructure and reveals, are sprayed with different colors. The paper is attached to the body with adhesive tape and remains on during succeeding painting operations. After it has served its purpose it is removed easily and without injury to the finish.

An operation called "ding" is performed with a small specially shaped hammer to remove any dents that may have been made in the body by accidental knocks. In general, this operation does not injure the finish, but if the coating is marred slightly, the abrasion is removed completely by spray-coating the spots.

Bodies then are unloaded onto a slat conveyor along each side of which extends a wooden platform for the workmen to stand upon while applying the top deck, as shown in Fig. 5. Other operations performed on this conveyor include chiefly polishing and touch-up work. Bodies then are placed on a lowerator for transfer to the fourth floor for the trim operations.

Cloth forming the trim for the interior of the body is received in bolts, unrolled, and spread about 50 layers deep on cutting tables. Templates are used to mark on the top layer of cloth the shapes required for the various parts of the trim. Electrically-driven cutters then are used to cut the 50 layers of cloth as marked out.

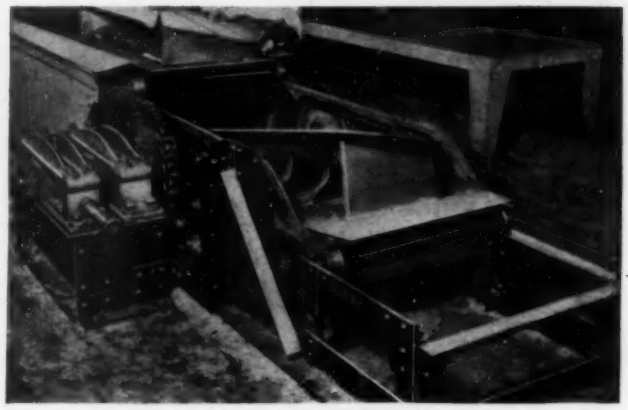


Fig. 7—Mechanism for transferring trim bucks from the return line to the conveyor line upon which seat-cushion trimming operations are performed

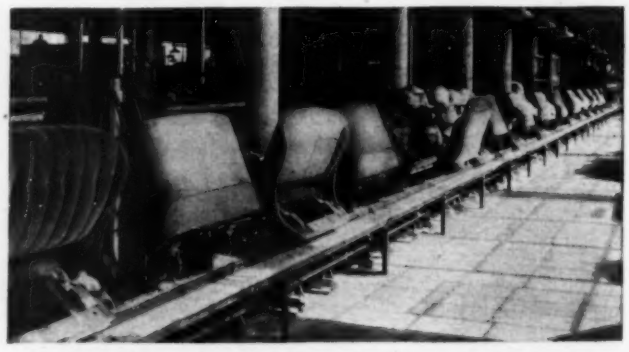


Fig. 8—Front seat frames for sedans have the seat backs trimmed as they move slowly along this conveyor line. The bucks are pivoted to facilitate the trimming operations

Fig. 9—Upholstery kits are delivered from the fifth floor to the body trim line on the fourth floor by the chain conveyor shown above

An overhead chain conveyor is used to carry the cut upholstery to the sewing tables. Here machines sew pockets on interior panels and tacking strips or "listings" are sewed with invisible stitching on one side of the head lining. Binding also is sewed around the outer edges of the carpet, linings are sewed on the seats and seat back covering to form pockets or "pipes" for the padding, and other sewing operations are performed.

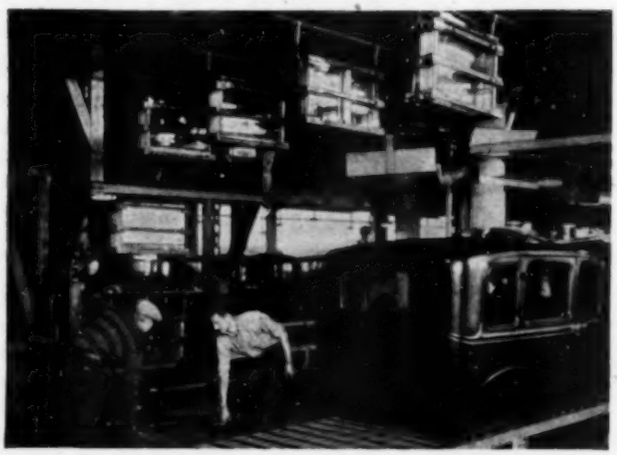
Upholstery that has gone through the sewing operation is thrown upon a belt conveyor and carried to a point

where it is stacked and put upon another conveyor which delivers its load to the trim storage department and "kit" room on the fifth floor, where the various parts required for a body are grouped into what is called a "kit." As these upholstery kits are needed for trim, they are loaded on various sections of the chain conveyors leading to the fourth floor, where the trim is installed in the body.

Cushions for front and rear seats are assembled on the conveyor lines shown in Fig. 6. 900 rear seat backs are produced per day on the one conveyor and 1,800 seat cushions on the other. In each case the upholstery is placed over the assembled frame and springs which then are inverted, one on each of the bucks or frames illustrated. As the various bucks traverse the conveyor line, they are forced beneath a series of rollers, compressing the cushion springs so that the upholstery can be tacked tightly to the frame under the right tension. After the nailing is completed the bucks pass out from under the compression rail, but the upholstery continues to hold the springs at the compression for which they are designed. When released, the bucks travel down a return line and the mechanism shown in Fig. 7 transfers them again to the upper line.

Fig. 10—Installing upholstery in bodies as they move forward on the slat conveyor. Droplights for use inside the body are plugged into a fitting which travels along the trolley lines above the body

Fig. 11—Racks of ready-cut window plate glass are delivered by the conveyor shown to the body trim line where the glass is installed



When ready for the installation of springs and upholstery, front seat frames for sedans are mounted on bucks on a conveyor developed especially by the Murray Corporation and shown in Fig. 8. Seats are mounted facing alternately right and left along the conveyor so that operators have plenty of elbow room. The daily output of this conveyor line is 900 front seats. The bucks are pivoted so that they can be swung into positions most convenient to the operators on each side of the line. When seats and cushions have been completed they are hung upon a chain conveyor which carries them to the body trim line on the fourth floor.

The Trim Line

In Fig. 9 is shown a conveyor carrying kits of upholstery from the fifth floor to the assembly line on the fourth floor. Bodies on the lower conveyor section in the foreground have just come from the final finishing operation on the seventh floor to be trimmed. An operator removes the contents of the carriers from the chain conveyor and places it in the car. Each bundle of material contains all trim parts for one section of a body.

Operators install the trim in car bodies as these bodies move along on the slat conveyor, as shown in Fig. 10. Crossing above the slat conveyor line is shown a chain conveyor line carrying cowl moldings on alternate hooks and racks of window glass for the cars on intermediate hooks. These racks of glass pass down a section of the conveyor as shown in Fig. 11, are removed in their containers by the operators and installed in the bodies. When a container is emptied, it is hung again on the conveyor line and goes back to the glass preparation department for refilling. Drop-lights needed for work inside the cars are connected to outlets that travel along overhead trolley wires as the body moves below on the slat conveyor. 44 windshields are delivered in assembled form to the trim department at one time on racks mounted upon wheel trucks.

At the end of the trim line bodies are inspected carefully and then are transferred by means of turntables to slat conveyors at right angles to the original trim lines, where the bodies are again carefully inspected for surface defects and are given any final retouching that may be necessary. When they finally pass inspection they are loaded on a lowerator, are carried by it to the first floor, pass along a conveyor traversing the ceiling of the 25-ft. bay at the outside of the press department, and descend an incline. Here the steel body-building skids are removed from the conveyors and are replaced by wooden timbers bolted beneath the body, making it ready for shipment. Bodies to be shipped in box cars are wheeled on small trucks to the doors of the box cars and loaded by hand. Bracing is carefully installed and protective material placed around the finished surfaces to prevent injury in transit. Shipments of bodies for automobile manufacturers located in Detroit are loaded upon motor truck trailers, each of which carries eight bodies.

When running at normal capacity, the plant unit here described produces 900 bodies each nine-hour day. At any one time there are approximately 1,933 bodies in process. Therefore, the time required from start to finish of operations in the building of a body is approximately two and one-eighth working days.

EXECUTIVE · FORUM

Should Salesmen Design?

THE ANTICIPATED success of the King Machinery Company's new line of paving machines had not materialized. With the announcement of the new model, a marked stimulus to sales had been predicted. Two months had elapsed since the new design had first been advertised, but the expected demand was clearly not in evidence.

Jim Sargent, King Machinery's sales manager, had just made a swing around the district sales offices and had thoroughly acquainted himself with conditions in the field. He had been in the plant hardly an hour before he received a call to the president's office. He found both John Edwards, the president, and Fred Longman, the chief engineer, awaiting him.

"I'll bet I know why you want me, Mr. Edwards," said Sargent as he entered. "It's about the new line of paving machines we brought out the first of February."

John Edwards smiled inwardly, appreciating that it was typical of Sargent to anticipate the purpose of the discussion. However, his face showed no amusement as he turned to his sales manager.

"You must have a guilty conscience," he replied. "I expected great things from this new model. Reports show that the sales for the country in this type of machine have increased 12 per cent over the same period last year; yet we are doing no better than with our old design. What is the explanation?"

"Frankly, I feel that my force is not one hundred per cent sold on the line. They claim that the machine is too heavy and clumsy to permit easy operation."

"But you saw the new design before it was announced," objected Edwards.

"Saw it, yes," responded Sargent, "but only after the patterns were completed and most of the materials purchased. I was not consulted about the design, but merely presented with it after completion. I am inclined to agree with some of my boys that today's market demands a lighter, faster-operating machine. Our engineering policy seems to be based on making each design a little heavier than the last. Now we have something too expensive and too cumbersome to sell."

Longman, who up to this time had been content to listen, now interrupted. "And what is your solution?" he asked.

"Before releasing any shop or purchase orders on new designs, I would call the sales force together. Show them a model machine, or at least a full-sized blackboard drawing. Then we can get a concensus of ideas right at the start. Such a practice would secure co-operation and would permit of no alibis."

"The idea is not entirely new," Longman pointed out. "Mr. Edwards can tell you we tried that procedure some years before your time. We received as many different ideas as we had salesmen. Each wanted something to satisfy the hobbies of his particular customers, and the net result was delay, with no constructive improvement in

What Do You Think Of This Executive Problem?

Salesmen naturally like to be consulted in the design of the product they sell. They invariably believe themselves well qualified to criticize and improve new designs. On the other hand, many companies make a practice of keeping their sales forces in ignorance of design changes until new products are ready for the market.

What is the practice of the company with which you are associated? How does it work out? The *American Machinist* is interested in an expression of your views on this subject and will pay for all contributions accepted.

design. Besides, as soon as the salesmen saw the new model, they lost all interest in the old. Customers, and in some cases competitors, got wind of a change in design before we could dispose of our old stock."

"We did have that experience sometime ago," agreed John Edwards. "At the time, we decided to give all available data to the engineering department and make it solely responsible for design. However, there is some merit in Sargent's suggestion, and I would be glad to see what could be worked out."

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DISCUSSION

OF PREVIOUS PROBLEMS

To Whom Should the Chief Inspector Report?

Among the factors which seem to me to be important in the settlement of this question are: the ability and knowledge of the product possessed by the chief inspector and other executives to whom he reports; the scope of authority of these same individuals; and the nature of the product, whether it is a simple one or highly technical.

The general manager may be the president's upstart son, while the sales manager may be well rounded in both factory and sales. The chief inspector may be 100 per cent on co-operation but weak in technique. Either the chief inspector or some of the executives to whom he reports may have very limited or very broad authority. The department most interested in inspection may be the sales department, service department, engineering department, or some other, depending upon the nature of the business. More usually, several departments are interested in inspection but in different phases and to different degrees.

Fundamentally, quality is not the product of the chief inspector nor even of his whole department. Quality is primarily inherent in the design, in the skill of the producers, and in the type and quality of the shop equipment. These factors, which determine the maximum degree of quality attainable, are controlled by several other departments. The inspection department endeavors to control quality only within the limits set by these others, and therefore, has a secondary responsibility.

I do not reason thus to depreciate the importance of the inspection department, but rather to emphasize the fact that many, if not all, departments of any organization bear responsibility in this question of quality. The duty of the inspection department, detecting errors, and the more important one, of preventing errors in other departments, requires a broad knowledge of the shop and its product, together with an unlimited amount of tact and ability to secure co-operation.

In the plant with which the writer is connected, there is manufactured a large variety of machines of our own design for stock. The inspection department is responsible to the chief engineer, and the plan works out very well. The engineering department is the natural source of the information necessary for the guidance of the inspection department, and the latter serves as the shop representative of the engineering department for the gathering of information to reduce and eliminate all sorts of manufacturing difficulties and to redesign, either for improving the product or for reducing costs. A real effort is made to make inspectors feel that they are representatives of the engineering department, and I believe a distinct advantage accrues to both from that feeling.

In a shop manufacturing to customers specifications, the sales manager, especially if he were trained in engineering, might be the logical person to receive the reports of the chief inspector. In a shop specializing in repairs, it might be better to have the chief inspector under control of the service manager. Where many departments are interested in inspection, the general manager would appear to be the logical supervisor. Have the chief inspector report to that executive where the best interests of the particular organization will be served.

—CLELAND C. ROSS, *Chief Engineer, Kellogg Manufacturing Company.*

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Does a Highly Developed System Pay?

In a small concern, where it is possible for the manager to carry every order in his head, a highly developed system can probably be dispensed with, but in a large modern organization it is absolutely essential. Without it, there will be an overlapping of responsibility, the neglecting of orders, broken delivery promises, and perhaps worst of all, no definite check on the cost of production.

Unless there is a properly developed costing department, how can the management be aware of whether money is being lost or saved on an order? Without an efficient estimating department, it is impossible to tender for new work with a reasonable hope of booking an order and at the same time of making the desired profit. He will certainly be a wonderful manufacturer who can keep his fingers on the pulse of the factory without a production engineer to watch the work through its different stages. With good organization, each unit will function and produce a co-ordinated whole; individual initiative will be encouraged and diverted into useful channels. I have seen a big factory brought under the beneficent influence of a highly developed system, and relative chaos has given place to efficiency.

Obviously the rush order, special experimental and extra work, must be treated separately. While I quite agree with Mr. Holland that these cases can with advantage be left to

individual initiative, I cannot help feeling that he has been guilty of one serious omission. After putting the emergency order in hand, care must be taken to insure that it is grafted onto the system, albeit after the event, thereby putting all normal production work in due relation to it. Without such a safeguard, hundreds of other jobs may suffer, and irate customers will make bitter complaints.

—G. W. TRIPP, *Member, Royal Ordnance Factories Apprenticeship Board, London, England.*

Is Budgetary Control a Cure-All?

Budgets are valuable in proportion to the extent that they are used as the basis of action within the business. The general administrative control, which is implied through the development of a budget, requires similar forms of control to carry through each department. The success of the budget is dependent on the extent to which each of the various departments has its work scheduled and analyzed.

The general manager may well have a chart constantly in front of him giving percentages by which each department is currently bettering or exceeding its quotas of production or expenditures as set down in the budget. If the budget is to be effective, he should constantly question figures which are much out of line in either direction, and thus guide the department manager toward the bull's-eye.

Budgeting for control has certain limitations that must be frankly recognized if disappointment from its use is to be avoided and its benefits are to be secured. In budgeting, it is a slow process to approach perfection, a process which involves trial and error. This must be understood by all executives, major and minor, or the budget plan is likely to fall into disrepute. Even if the budget figures are not capable of being fully lived up to during the first few years, the advantages gained from a careful consideration of all factors influencing the trend of the business, and the advantages of having the major executives with all the cards of their various departments on the table should not be overlooked. Budgeting cannot take the place of adequate executive control of operations. It is only an aid.

—FREDERICK KAMPMEIR, *Manager, F. Kampmeir Cigar Company.*

Who Should Do the Estimating?

The responsibility for estimating machine shop costs should not be added to the already numerous duties of the shop executives. Certainly the machine shop foremen should be consulted in cases where any difficulties or doubts arise as to the best way to handle a job, and in regard to what machines are available, whether they are suitable, and supplied with the necessary tool equipment. It is unusual to find machine shop foremen nowadays with sufficient all around experience to give reliable estimates of machining times on a variety of machining operations, even if they could find the necessary time to work out a reliable estimate.

The estimating staff should have the necessary technical and practical experience collectively to make accurate estimates of labor costs on any machining operations, the planning and sequence of operations having been first approved.

The estimating department has also the advantage of the data it has collected from previous work and it is able to check its estimates from time to time, from the actual machine shop costs. Carefully compiled data is a great asset to the estimator, especially where work of a similar nature is being repeated from time to time. By all means, let the estimating staff seek the co-operation of the shop foremen, but not as a means of relieving itself of its responsibilities.

—W. L. WATERHOUSE. *Smethwich, England.*

Will it Pay to Enlarge the Plant?

When it seems that a sudden increase in plant production capacity of fifty per cent is necessary to hold the business of old customers, the time has come for serious thought. Either the sales force has become more efficient, business has boomed, or there is something decidedly wrong in the policies of the management. These sudden plant expansions are to be avoided, as they are always attended with bad effects.

In order to live and be at all prosperous, every business must have a healthy growth. Due to the constantly changing conditions of markets, materials, transportation, and production, a discerning vision is required to determine the rate of this advance in size.

There should always be an excess capacity for production over that required to meet the sales. This margin, large or small, should always be preserved as a measure of safety against emergencies, such as breakdowns or a sudden unforeseen increase in sales. Where such a margin is not had in the plant, it can be instituted by a policy of replacing wornout or obsolete machines and equipment. The new machines should be bought and installed because they can do more work at less cost than the old. At the same time, their capacity should be such, that they can produce more work than is needed at the time they are installed. This margin or factor of safety for the production elements ought to be around ten per cent for the average business.

As an example of the wisdom of excess capacity, I have never seen a report stating that all of the plants of the large steel companies were running at full capacity. Before one of their units of production is operating at full capacity, additions to it are begun.

— L. O. BROWN, *Toolroom Foreman, Holcomb and Hoke Manufacturing Company.*

Keeping Tabs on Stocks in Hand and on Order

By John R. Godfrey

A method of unit storage that shows quantity on hand, when substitution can be made, and that facilitates inventory

STORING supplies and spare parts so that they can be found when wanted without unnecessary delay, economizing space, and still keeping the stock in sufficiently good order to avoid criticism as to appearance, is no easy task. And when all these are accomplished there still remains the question of whether inventory can be taken easily or not. The storehouse of the United Railways & Electric Company, Baltimore, Maryland, a description of which was published on page 43, Vol. 71, of the *American Machinist*, appears to be planned so as to meet all the specifications mentioned. It is strikingly neat, and all materials are stored by different methods depending on their kind. Best of all, it is kept according to a plan that seems to have many advantages. To begin with, very little material is left in the package in which it is received. Lanterns, for example, are unpacked, inspected, and stored on shelves in crates. This has several advantages. It immediately detects broken globes or other parts, and allows claims to be made while the shipment is fresh in mind. It saves storage room, as such articles are of necessity packed in excelsior and cartons. It also removes the fire hazard incident to such inflammable material and appreciably reduces the insurance rate on the building. It also checks up on the count, preventing embarrassing shortages when the articles are finally unpacked.

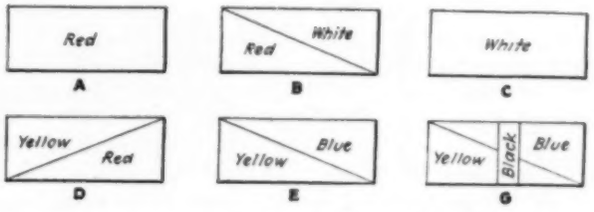


Fig. 1—Markers that show the amount of material on hand

Supplies like bolts, nuts and rivets are carried in comparatively small, shallow metal trays made in the tin shop. They are designed to hold a given number of pieces, usually in even 5's or 10's, the required number being stored by placing one tray over the other in its proper bin. This plan not only enables the storekeeper to know the condition of his stock but also makes the taking of the annual inventory an easy task. All that is necessary in any case is to take the count from the tray beneath the one on top, which shows the total up to that point, and add the number in the top tray, from which all parts are taken to fill any order presented.

The only counting necessary is of the number of pieces in the top tray. Small rivets and similar parts are weighed instead of counted, a pound being put in each tray. With large parts or heavy material care is taken to limit the total weight to 50 lb. in each unit. This saves the necessity for undue exertion and tends to prevent injury either from strain or accident.

The use of trays, as described, also makes it easy to keep track of the supply of material on hand for ordering purposes; a glance at any bin shows approximately how many parts are there. Only the total beneath the top pan need be noted, as the amount in the top tray is negligible. This enables the storekeeper to keep his supply at normal with a minimum effort.

The storekeeper has worked out a number of interesting methods of keeping tabs on the material. A set of six markers, as in Figure 1, enables him to indicate when material should be ordered, whether or not it has been ordered, and other information he should know. These markers are $\frac{1}{2}$ in. wide, and from $3\frac{1}{2}$ to 4 in. long, with about $\frac{5}{8}$ in. turned up on the end. They are made from scrap metal and painted by an assistant in the stores department. These markers are slid under a tray and are plainly visible.

A solid red marker *A*, shows that there is a surplus in the store room; red and white *B*, indicates the material is inactive; all white, as *C*, means that the stock is still good but is inactive or seldom used; while yellow and red *D*, shows that the stock is obsolete and may be disposed of later.

When the stock gets down to the number in the bin which is indicated by the absence of red marker *A* re-ordering is probably necessary. When an order is placed the yellow and blue marker *E* is slipped under the tray and indicates that an order has been placed. In cases where certain materials are in great demand, or

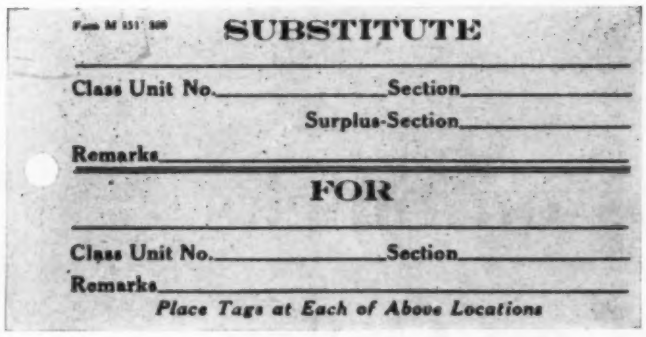


Fig. 2—Substitute card that aids in clearing out old stock

where delivery is slow, it is sometimes necessary to place a second order before the first order has been received. Marker *G*, similar to *E* except for the black stripe in the center, shows that the second order has been placed or that, in storekeeping language, there are two "open orders." When the first lot ordered is received, marker *G* is removed leaving *E* to show that more is to come.

Another interesting feature of the store room system used, is one devised to aid in getting rid of obsolete stock. If, for example, it is decided that bolts 2 in. long instead of $2\frac{1}{4}$ in. will be used on certain jobs and there is a large stock of $2\frac{1}{4}$ in. bolts on hand, it may be possible to use the longer bolts as long as they last. When this can be done the "substitute" red tag is fastened in front of both the 2-in. and the $2\frac{1}{4}$-in. bins. The bill of materials calls for 2-in. bolts. But on reaching the bin where they are stored the storekeeper is confronted with the red tag, Figure 2, telling him to substitute $2\frac{1}{4}$-in. bolts for 2-in. on the list and also showing where these bolts are to be found. He then goes to the proper surplus section bin as directed and uses the $2\frac{1}{4}$-in. bolts as long as they last. When the $2\frac{1}{4}$-in. bolts are used up the red substitute tags are removed from both bins. This method has greatly facilitated clearing out a lot of material of the kind that too frequently lies around for weeks because someone overlooks it. Inventory represents so much idle capital that any method which will reduce its volume and aid in more rapid turnover must be carefully considered by the efficient manager. The plan outlined seems to have much to commend it.

Apprenticeship Courses for Seniors

By John A. Masek
Consulting Engineer

In the effort to train the young man has the older worker been overlooked? Courses designed to keep the senior mechanic abreast of the times should prove highly profitable

MUCH has been said about the need of man power for various lines of industry. The system of apprenticeship for juniors, as adopted by many concerns, is as complete an education as it is possible to obtain in any desired line. Though some companies confine the apprentice to a particular branch of a trade, others offer instruction in shop mathematics and, in many instances, allow the apprentice to spend a certain amount of time at other lines of work, thus producing an all around craftsman. I know of many plants where apprenticeship courses cover the following schedules: pattern shop, foundry, drafting room, and machine shop, with some work in the engineering department.

I have watched the progress of numbers of young men, who have gone steadily through the apprenticeship courses and have made good, one being appointed foreman within a year of his apprenticeship. At one time, I wondered what was going to become of all the apprentices, as the time came when one by one, they took the places of older men in various departments. Naturally, the older men began to buck the apprentices. This, of course, did not remedy the situation, nor did it make it any better for the older men. As a matter of fact, it did them more harm than good.

We must all admit that the young man of today has great advantages with his training in modern methods on modern machinery. I began to realize this, and the thought came to me that there must be a way to put the older man in a better position than he is now. When the older man served his time, all his tools were different. Equipment was entirely unlike that of today; fits were mostly hand made. Times have changed, and new methods have been developed, making all the experience that made this man a first class mechanic count for little with modern machinery. But there is something about this man that is not found in the junior apprentice. The grounded experience of time plus educated carefulness make the master mechanic.

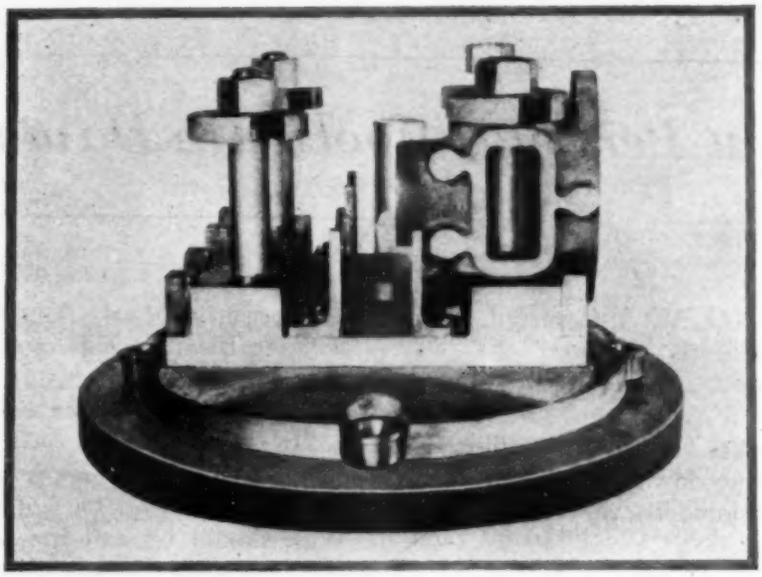
Let us take this man and give him course instruction in the shop just as we do our younger apprentices. Watch his progress; compare his class of work with the amount of actual scrap, and you will find you are building up a new organization of skilled labor. At the present time, old mechanics are gradually getting away from the shop and doing almost anything to earn a living. In many instances, the man over 45 years of age finds it hard to get established when he leaves his old job.

In Muskegon this year, an appeal was made by certain employers asking their shop men to take a particular course of instruction in foremanship. An advertisement read, "If you will pay half, the employer will pay the other half." There is a growing need for foremen of the skilled mechanic type, the older men; this town recognized it when it made the appeal.

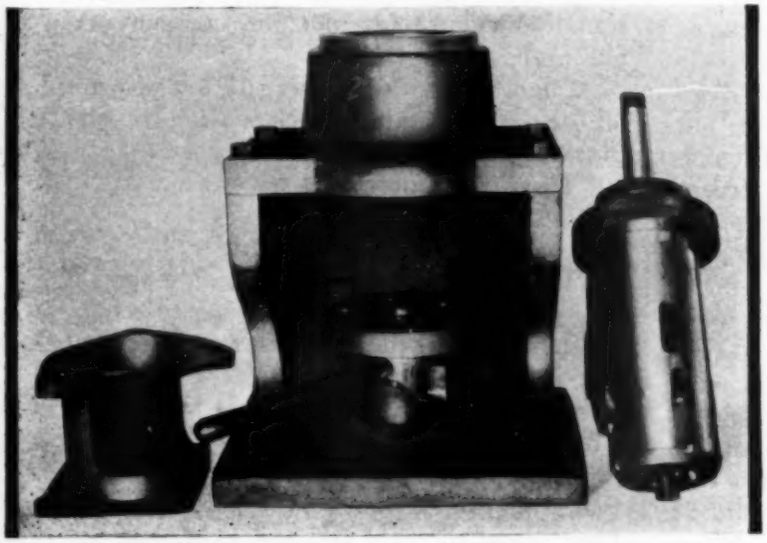
The cry is, "What are we going to do about skilled mechanics? We can't get them." That is entirely wrong; the skilled man of yesterday is still here, but he needs to be brought up to date. When some industrial leader cares to start such a program others will follow, and the situation will be relieved both for the man who is being discarded and for the employer.

Tools Used in Pacific Coast Plants

At the right is shown an indexing-type milling fixture for facing manifolds. Two pieces are milled at one setting. The work is located in V-blocks, and is held down by C-washers and nuts. Two pieces are milled while two are being loaded at the opposite end of the fixture

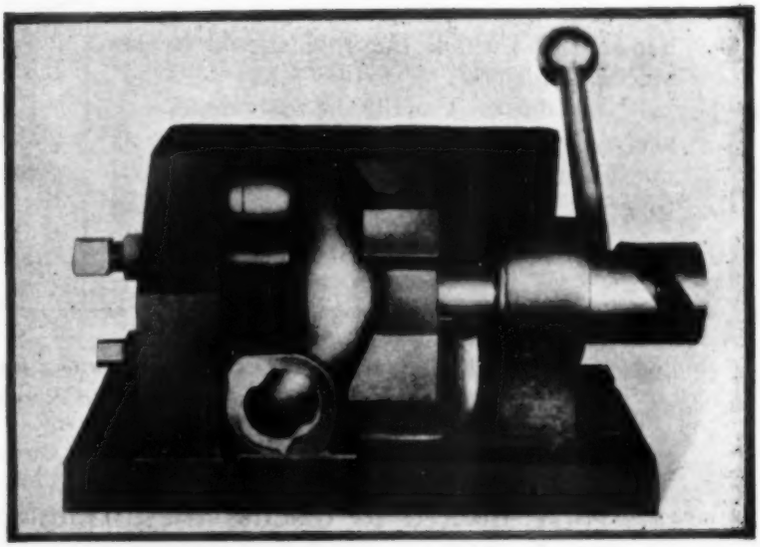


The first of two picture pages. Photographs by Courtesy of the Standard Tool & Die Company, Berkeley, California.



At the left—Jig for receiving and chamfering brackets for water pumps. The work is mounted on a plate and is raised against a hardened ring below the bushing plate by a cam-operated plunger. The work and the tool are both shown

At the right—A fixture for milling the water inlet elbows for cylinder blocks. A cam-operated clamp holds the work against locating blocks. The rise of the cam is generated so as to give rapid closure and powerful holding pressure



The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been prepared

THE · FOREMAN'S

When Personal Tools Are Damaged

"MORNING, Al," Ed greeted, as the two friends met on the way to work. "What's the matter, trouble at home?"

"No, what makes you think that?"

"Well, you came down the street looking like you were a hundred years old. How come?"

"I was thinking of what I would say to Williams. I've got to see him this morning."

"What have you been doing now?—as you say to me."

"Now, don't get humorous. When I go to see Williams I am on the offensive, not the defensive, like you. One of my toolmakers broke his dial indicator yesterday, and came to me for a new one. He puts up a good argument, but I am wondering if it will get by Williams."

"We are not responsible for personal tools, are we? If we start that game every man will have a full kit. I've seen that tried before."

"Maybe you have, and maybe again, if we undertook to replace stolen tools we would be doing as you say, because men would be careless, and tools would disappear. When a tool is broken, however, and the parts handed in, I think the tool should be replaced, don't you?"

"No, I don't. Usually the tools that break are old, worn-out ones, and there is just as much chance of a man breaking an old tool to get it replaced, as there is of his losing it to get a new one. A man has no business bringing his own tools into the shop. If he does, it should be at his own risk, because it is for his own convenience."

"It may be for his own convenience, Ed, but it helps the company get out its work. The same thing is true of a pattern maker. Why should he and the toolmaker be the only ones to furnish an expensive kit of tools? And if they break one of them occasionally, why should not the company replace it?"

"I don't know the answer, Al, but why not let the company furnish such tools in the first place?"

"Then everyone *would* have a fine kit of tools."

"Everyone is not a thief, Al."

"Wait a minute, big boy, a minute ago the men that had tool kits were going to replenish their stock at the company's expense, now you infer that if the tools were furnished by the company, no one would steal them. You are reversing yourself, but I will take the other side of the argument and point out that while we all may not steal, we all graft. How about the fare you and I owe the railroad?"

"But, Al, that's a joke on the railroad. It's not done deliberately."

"Sure it's a joke, but the railroad doesn't get its fare, does it? Getting tools from the company is a joke too, but the company loses the tools."

What is fair in this case? Does the hourly rate of the toolmaker and pattern maker take into consideration his tool kit?

Idea suggested by V. G. Darby, Cherry Burrell Corporation

Foremen are invited to discuss these questions vital to their work; of course the

ROUND · TABLE

DISCUSSION OF EARLIER TOPICS

Raising the Working Efficiency

THE successful use of instructors in the shop depends to a large extent, on the class of work and type of help employed.

In shops where men of the operator type predominate, a good instructor who is a real mechanic, would be both welcome and valuable. The average operator feels that he knows only a small part of the machinist trade and that his fellow workmen are no better off.

The teaching of new men is often left to foremen who are not good teachers, and whose duties are so numerous that they could not teach properly even if capable of it. One of the most troublesome things for new men to learn is tool grinding. How poorly this can be done was recently observed when a new lathe hand had attempted to grind a turning tool. He complained that the tool acted strangely and would not stand up. On investigation it was found that the clearance angle was about forty degrees which is enough to make any tool do peculiar things.

It is in places where such incidents are more or less common that a good instructor would be valuable. In shops that employ good machinists, and especially on work that is heavy or in very small lots, an instructor would be of little value.

In general, instructors should be used where considerable teaching is to be done and where the work is of a production nature. Their employment should be avoided on work where the judgment of one skilled man is as good an another's. On work of this type the foreman would be settling disputes as a regular duty, and production would be impaired.

—L. F. SWENSON, *Industrial Engineer, Perkins Machine & Gear Co.*

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What You Do, or What You Get Done?

OF COURSE, there is but one answer to that important subject in the view of management—it's what you get done that counts in dollars and cents. Yet often management itself is the guilty one in not properly training the foreman to that standard. When times are not so good, in many factories the departments lay off hands and those that are kept are pushed a little more to get out what work there is. Promises of delivery are not always given proper dates and in consequence much stuff is overdue and in a rush state. This worries the foreman and he is apt to dig into some of the tight places with his own labor. When he forms this habit it is hard to keep his eyes and mind on the rest of his job. If the factory is being run right, and the returns are sufficient, he should at all times be allowed enough equipment and men to produce the work without his acquiring the feeling that he ought to dig in and help manually. Personally, I like the man who can dig in and push a job through by his own methods and help. Yet I train him to my ideal of attaining more with his head by planning, and hold him blameless if he does this first, and only performs personal work at a time when his judgment proves that he has not a man at an important step in the work whom he can trust to get it through. The occasional manual application keeps the foreman a master of his craft and holds the respect of his men, for he can both plan and do.

—CHARLES H. WILLEY, *Asst. Plant Supt., Hoyt Electrical Works.*

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Learning from the Small Shop

IF WE are in the habit of tooling only for large quantity production, we will perhaps be too much inclined to order special tools for a small quantity job, when it comes along. But, if we have established the habit of considering every tooling proposition as a financial investment which should return the maximum dividend on the money and time invested in the tools, we will not order special tools unless they fulfill that requirement. Our chief consideration should be: what tools will produce the greatest possible profit?

The relation of tool costs to total labor and material cost, is of no importance if this policy is always our guide. Works are run to make a profit, and their survival depends upon that achievement, and not upon the relative cost of tools to the cost of labor and material which, obviously, will vary according to the work to be performed. To illustrate, these relative costs would not be the same for the production of stoves as for cash registers.

Whether the shop should be at liberty to use its own methods depends upon the organization. If the shop can plan the best methods, yes. If not, no. The best methods should be adopted, no matter by whom devised.

—J. J. WOFFINGTON, *Warwickshire, England.*

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Advising Employees About Their Affairs

GOOD work of any kind requires concentration, and concentration is a stranger to a fretful mind. Paternalism is an elastic term which may cover equally, abuses or benefits. Paternalism of the kind that dictates a man's private course, leaving him no choice but submission or dismissal, runs counter to all ideals of liberty and should be resisted with vigor. On the other hand, the kind of paternalism based on education, suggesting avenues of betterment, means to attain a richer life, but leaving to the individual the choice of benefits and the manner of their acceptance and enjoyment is the kind of paternalism that progressive thinkers wish to see

discussion is not limited to foremen. Letters accepted and published will be paid for

advanced. What does it matter to the individual that the employer's motive in promoting that kind of paternalism is to increase profits through the greater efficiency of his working force, so long as the worker himself is benefited? It is rather an added bond between the two.

Not so long ago men resented the physical examination now generally accepted as a formality of employment. We now accept the examination, not as a mean streak in the employer desiring to expose our secret infirmities, but as a sincere desire on his part to protect us from their further encroachments. Surely, no one could object to free medical and dental service such as is now available to employees of many large firms and corporations. The same applies to group insurance, where the combined buying power of the organization makes available to the group benefits beyond the reach of the individual. Why should not the same apply to legal advice and investment? If we admit that contentment is an asset to the employer, it seems fair that he should provide legal advice on a group basis.

I would like to see all large firms maintain an investment bureau for the benefit of their employees. We can all agree that every worker should regularly save something from his income, no matter how large or small. It is futile for me to say that my wages are so small that I can just make ends meet, for I know very well that they might be still smaller, and I would still get along. The answer is to discount a fixed percentage of my income for savings and investments. And here is where we need more paternalism. We need investment help and opportunities in addition to educational opportunities, medical care, and legal advice. We need a financial or investment bureau to retain at our solicitation a fixed percentage of our pay check and divert it to a fund.

This brand of paternalism can spread still more without becoming offensive. In fact, it is bound to spread by the very nature of progress, since we are continually growing more collective and less individualistic. I picture the factory of the future not merely as a work shop, but as an educational, social, and recreational center, with opportunities for all to learn, live, and enjoy in the most congenial atmosphere. It is idle to say that we need contrasting associations, as long as we revert to shop talk in our idle moments. So by all means let us have more paternalism and more social atmosphere within the factory.

—ALFRED WASBAUER.

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Should the Workman Share Responsibility?

I DO NOT believe Ed was justified in firing a good man under the circumstances. The fact that there was not a drawing of the piece, nor a jig that fitted the work properly, lets the workman out to a certain extent. In this case, Ed should have made sure that the man understood thoroughly about placing the jig. He should even have supervised the first piece.

I believe Ed fired the man because he lost his temper. A broad-minded foreman would not fire the man whom he terms his best man, for scrapping work under the circumstances. Ed admits that there is a doubt as to whether he explained the job thoroughly.

I do not think, however, that the man is fully exonerated. If he is good enough to justify the compliment that Ed paid in calling him his best man, he should be big enough to feel some responsibility. If the man had any thought that the work would be spoiled he should have reported it. I think he should be disciplined for taking the attitude that he did toward the affair. A good mechanic cannot justifiably say that he is not being paid for taking responsibility. Most shops recognize these good men and pay them for what they know, as well as for what they do. How can a man expect eventually to be chosen as a foreman or executive if he is not willing to accept responsibility?

—RALPH N. STRYKER, *Tool Designer, The Elliott Company.*

* * * *

THE · NEXT · TOPIC

"Boss or Advisor?"

Advising Employees About Their Affairs

SUMMARY OF THE DISCUSSION

One of Al's men became so careless and inattentive to his work that Al sent him home. On the way out, the man met Williams, the superintendent. Questioning brought out the information that the man had been in an automobile collision and was worrying so much that it affected his work. Williams sent him to the company attorney, and asked Al to allow him to return to work. Ed resented the "meddling" of Williams, both in departmental and private affairs, but Al contended that Ed was wrong in both instances.

TO DO good work requires concentration, and concentration is difficult for a fretful mind. Paternalism is an elastic term that may cover, equally, abuses or benefits. Paternalism that runs counter to ideals should be resisted, but paternalism that suggests avenues of betterment, leaving to the individual the choice of benefits and the manner of their enjoyment, is the kind of paternalism that progressive thinkers wish to see advanced.

Those who oppose paternalism argue that a man can take care of himself if he receives enough pay. When living was a simple matter of getting enough money to pay for food, shelter, and clothing, this may have been true, but in our present complex civilization it is necessary for all of us to call for help occasionally.

When a company hires a man, it provides him with the necessary tools and materials with which to do the work, but there can be no doubt that the mental state and physical condition of the man have a decided effect on his production. Means should therefore be provided to care for the mental and physical needs of employees.

TOOLING for 250 Pistons an Hour

By Frank W. Curtis

The Plymouth piston department is laid out for straight-line production with the machines interconnected by delivery chutes

PISTONS for the Plymouth automobile, a product of the Chrysler Corporation, are cast of Lynite and machined to the general dimensions shown in Fig. 1. Features of the piston include open sections at the lower side of the wristpin bosses as an aid to lubrication, and an angular slot in the skirt to compensate for expansion and contraction at different operating temperatures. The head of the piston is fitted with two compression rings and an oil scraper ring in the lower groove in which a number of oil holes are drilled to permit the return of excess oil to the crankcase on the downward stroke of the piston.

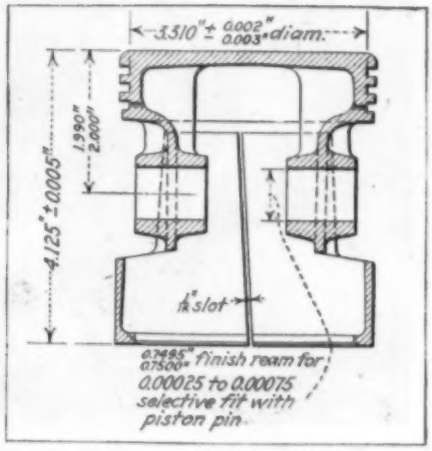


Fig. 1—General design of the Plymouth aluminum piston

The manufacturing operations are carried out, in the following sequence:

1. Rough bore, rough face, and chamfer open end and center head end.
2. Rough turn O. D., rough groove, rough face head end, and form radius on head.
3. Drill and rough ream wristpin hole.
4. Saw horizontal slots under the head.
5. Finish bore and finish face open end, and center.
6. Finish turn O. D. of head and skirt, finish ring grooves.
7. Saw expansion slot in skirt.
8. Finish grind O. D.
9. Finish face head end and cut off center boss.
10. Drill two $\frac{5}{32}$-in. holes at wristpin bosses.
11. Drill twelve $\frac{3}{32}$-in holes in lower ring groove.
12. Semi-finish and finish ream wristpin hole.

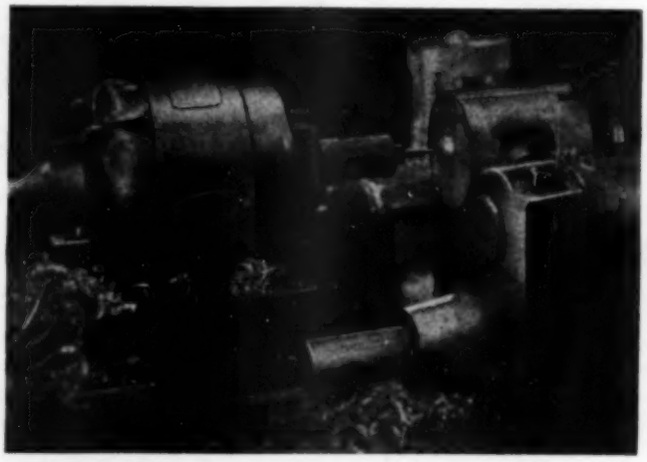


Fig. 2—The center hole is drilled in the head end of the piston while the open end is being faced and bored

The piston department machines are laid out in two rows, and the work passes in a straight path to the inspection room, going from there to the connecting rod assembly bench. The machines are interconnected by chutes to aid the movement of the work from one machine to another, and the operations are timed to permit a uniform production schedule of 250 pistons per hour.

For the first operation, the piston is held by an air-operated chuck on the carriage, that permits a boring tool to enter from the open end of the piston. Working in connection with this tool is a facing head for rough boring and facing the open end. Centering, which is performed at the same setting, is done by an individual motor mounted on the tailstock of the machine. This drives the center drill as illustrated in Fig. 2. The tailstock slide is operated manually while the automatic feed of the facing head is engaged.

The piston is located from the bore and face at the open end for three operations that follow. After these three operations the open end is finished to size. Rough turning, grooving, and facing of the head end is done in a Lo-Swing automatic machine, as illustrated in Fig. 3, the work being located on the rough bore in its open end, and on the tail center at its closed end, and driven by means of an air-operated mandrel between the wristpin bosses. The pistons roll down a chute located at the front of the machine, from which they are removed by an automatic pick-up attached to a radially operated arm, which is clearly shown in the foreground. The arm has a second pick-up unit positioned in such a way that it removes a finished piston from the machine and places it in a discharge chute located at the rear of the machine. The arm and the pick-up units are air

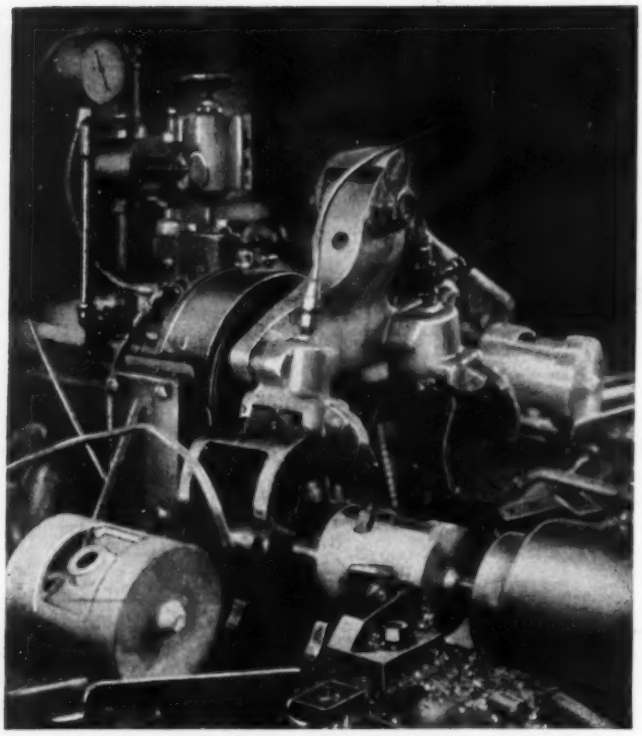


Fig. 3—The outside diameter and the ring grooves are rough machined in an automatic machine equipped with an automatic loading and unloading device

operated and are engaged automatically by an attachment to the cross-slide that functions after the cutting cycle has been completed. The turning tool is located in the front tool block, while the grooving and facing tools are located at the rear.

Wristpin holes are drilled and rough reamed in the jig illustrated in Fig. 4. The open end of the piston is located on the plug *A*, then the center *B*, operated by a handwheel, is adjusted to the center hole drilled in the head end. Radial location of the work is secured by the spring-operated V-block *C*, which engages the wristpin bosses on the inside of the piston. The brackets on which the adjustable center is mounted, are pivoted for quick removal of a piston. The piston is locked in place by a latch *D* made with a plate that fits over a hardened stud in the fixture body. The plate latches automatically and is easily released by pulling the handle *E*. The small spring plunger holds the latch in place. When the work is received for this operation, the wristpin hole has been cored to $\frac{5}{8}$ in. diameter and the operation finishes it to 0.746 to 0.747 inch.

The angular slot, $\frac{1}{16}$ in. in width, is next machined, using the fixture illustrated in Fig. 6. The piston is located by its bore on the plug *A* and is held by the clamp *B* which is of the swinging type to aid loading. The piston is located radially by the plug *C* that fits into the wristpin bore. As can be seen, the axis of the piston is offset angularly from the center line of the fixture to provide the correct angle for the slot in the skirt.

Finish boring, facing, and chamfering of the open end is done in a machine equipped with a pot-chuck in which the piston is located by means of a pin passed through the wristpin holes. An air-operated head center is engaged and the open end re-centered. In Fig. 5 is shown the tool layout for the operation. The tool block is fed to the work in a horizontal plane, and is so arranged that all the cuts are done at once. The block has three tools, the one shown at *A* for facing, that at *B* for boring, and the V-shaped tool *C* for chamfering the inside and outside edges.

Grinding of the piston is done in a horizontal grinder. Approximately 0.015 in. is left for grinding, the operation being handled in the conventional way. An amplifying gage of the indicator type is used for inspecting the finished piston.

Two holes are drilled in the wristpin bosses in the jig illustrated in Fig. 7, which is arranged to hold the work at an angle of 20 deg. The piston is located against the form face *A*, made to the proper diameter and angle, whereas the radial location is secured by the plugs *B* that fit the previously machined wristpin holes. An outstanding feature of the fixture is the dual operation of

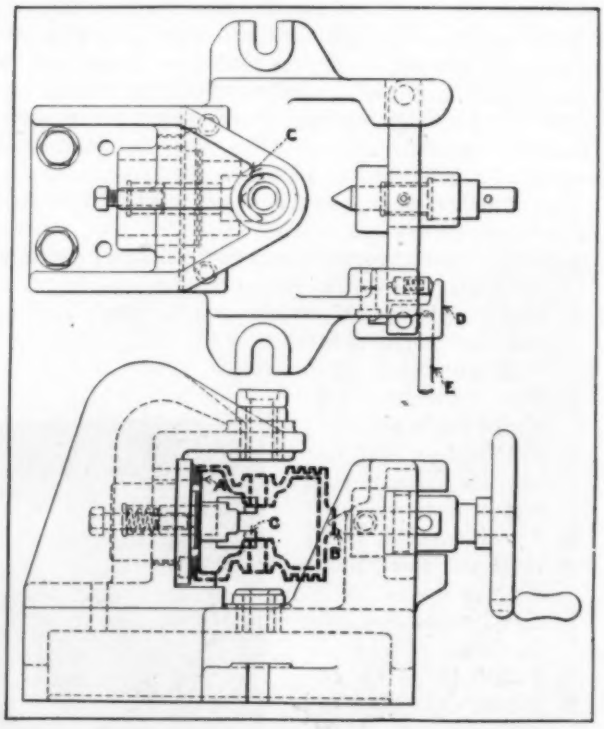


Fig. 4—Rough finishing of the wristpin holes is done in a jig equipped with interchangeable bushings to permit the use of a core drill and an inserted-blade reamer

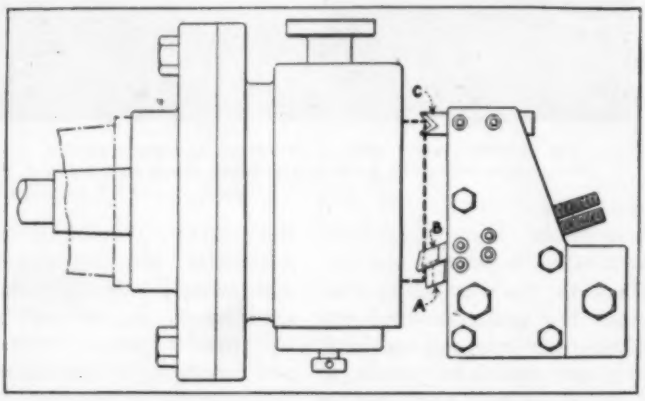


Fig. 5—A layout of the tool block for finish boring, facing, and chamfering the open end of the pistons

the locating plugs which is handled by means of interconnected levers. When the lever *C* is forced in the direction of the arrow, it disengages the plug attached to its opposite end, and at the same time the lever *D* connected to the opposite plug is likewise disengaged through movement of connecting lever *E* and the equalizing link *G*. The arrangement permits rapid loading and unloading of the fixture.

The next operation is the drilling of twelve $\frac{1}{32}$-in. oil holes in the lower ring groove at the head end of the piston. The operation is handled in a special multiple-spindle drill as shown in Fig. 8. The spindles of the machine are located radially and operated in unison so that all holes are drilled simultaneously. Following this operation the wristpin holes are semi-finished and finished, reamed to size, which includes the removal of approximately 0.002 in. on the diameter. The operation is done manually by feeding the piston over an expanding reamer. The piston is kept from turning by blocks located on either side of the reamer. The pistons then go to the bench where the burrs on the lower ring are removed, followed by a wash in gasoline and a final inspection before assembly with the connecting rod.

Fig. 6—A $\frac{1}{16}$-in. slot is sawed in the skirt of the piston in the angular fixture shown

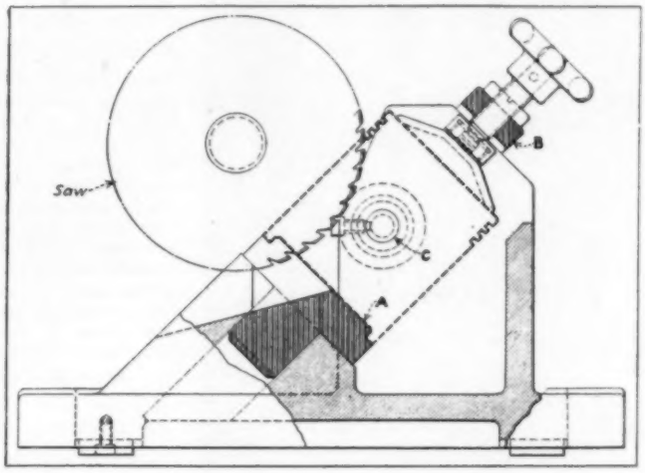


Fig. 7—Special features of the jig for drilling two oil holes in the wristpin bosses

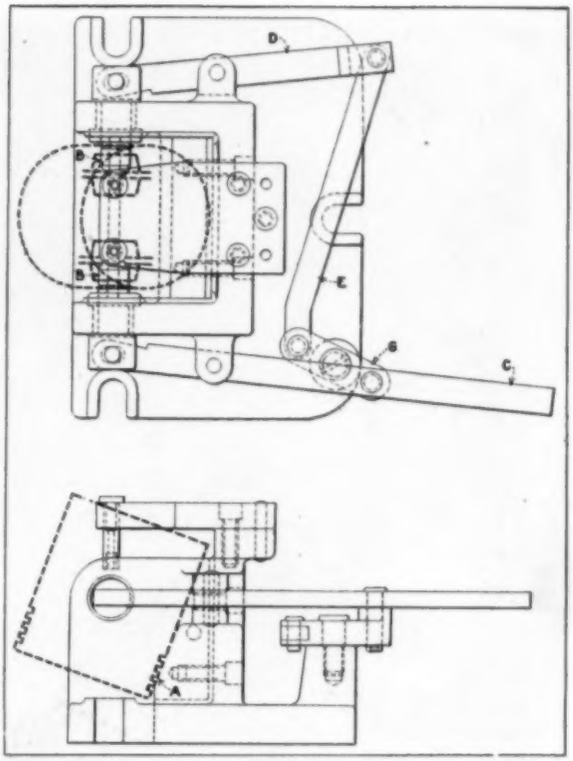


Fig. 8—A series of oil holes are drilled in the lower ring grooves in the special machine arranged with spindles that operate in unison

Shortening Labor in Design Calculations —*Discussion*

By E. Manning

IN THE article by Alfred Wasbauer on page 617, Vol. 71, there appears to be an error in application of the formula. In order to solve for *D*, the author has transposed the formula thus:

$$D = \sqrt[4]{\frac{7{,}204\,HM}{RL}}$$

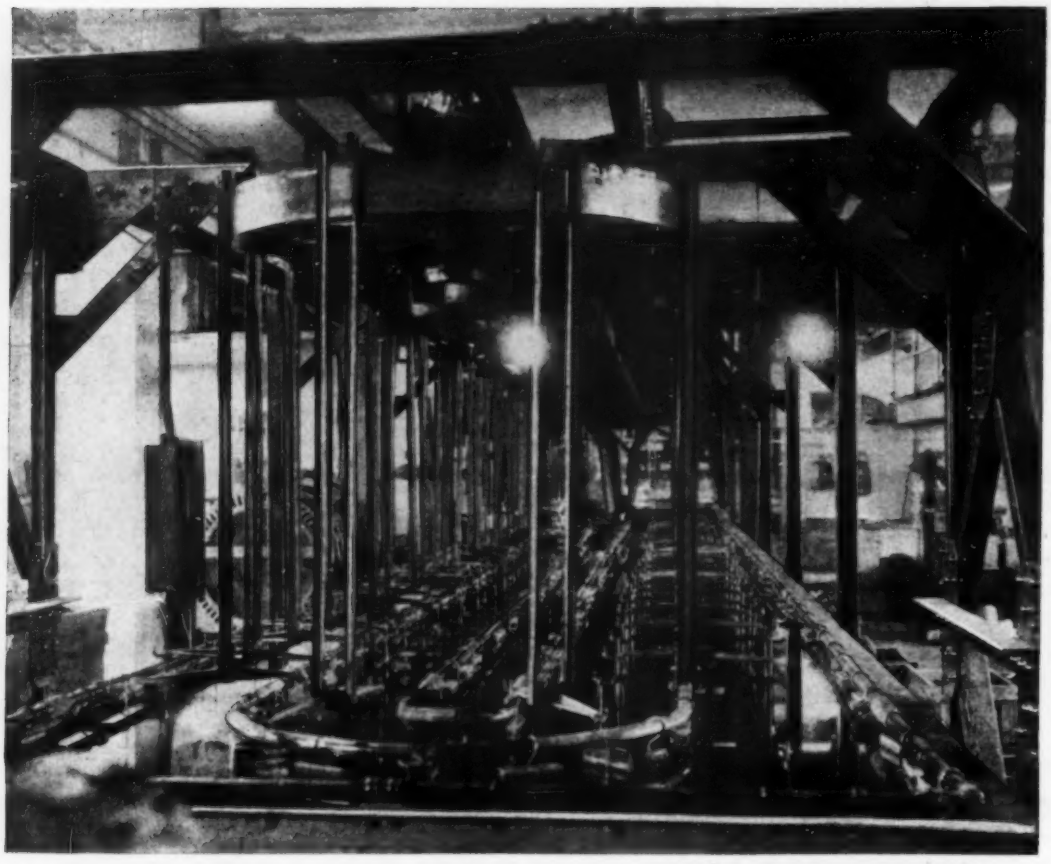
The first formula is correct, but should be transposed to:

$$D = \sqrt[4]{\frac{2{,}204\,LH}{RM}}$$

Therefore, in the second example, the solution should be:

$$\sqrt[4]{\frac{2{,}204 \times 30 \times 25}{80 \times 20}} = 5.66\,D,$$

instead of 4.6 horsepower.



About 12,000 pieces are cadmium plated per 8 hour day in this automatic machine. A chain conveyor moves the work to the successive operations. Auxiliary chains lift the parts into and out of each tank, and are timed to govern each process exactly

PRECISION PLATING Through Timed Equipment

By G. W. GAMMONS
General Electric Company, Schenectady

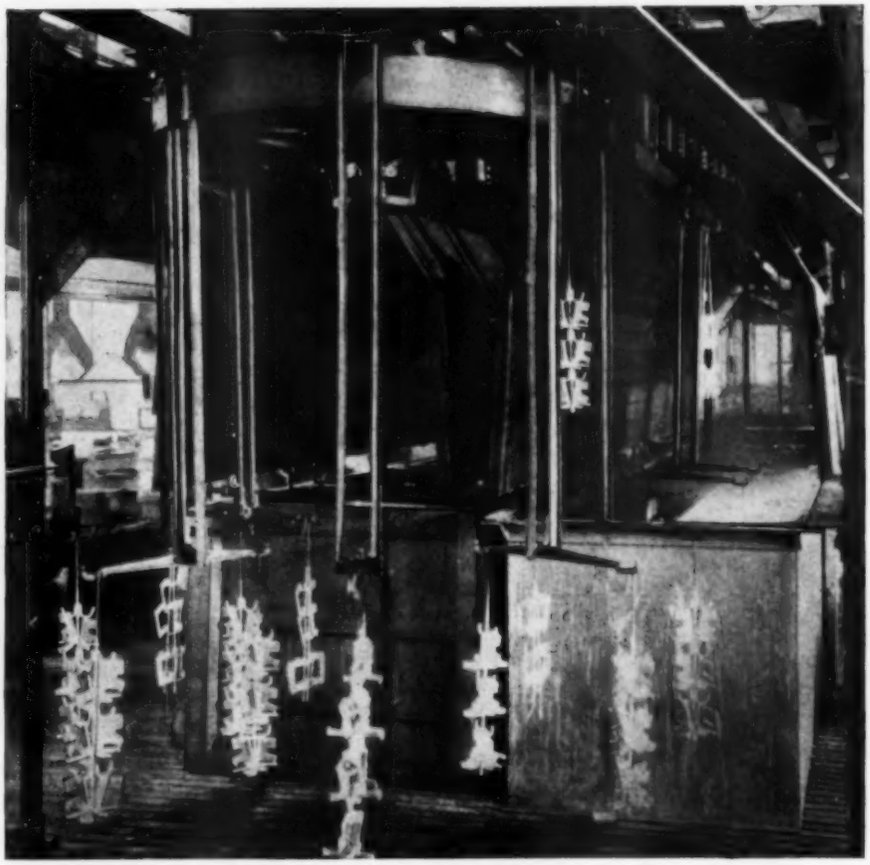
DURING recent years the demand for plated and lacquered stock parts grew so great at the Schenectady plant of the General Electric Company that it was found necessary to relocate the finishing department and to install new automatic equipment. This department is now functioning.

Before the changes were made, the department was situated on the ground floor. Finished work had to be transported to the stock room on the third floor by means of battery trucks, resulting in excessive lost time at the elevators. In consequence, it was decided to move the plating and finishing department to the third floor and to install conveyors to run the finished work directly into the stock room. This arrangement effects a considerable saving each year.

Among the new equipment is the automatic cadmium plating machine, which is one of the largest installations in the country. Its capacity is 12,000 average size pieces per 8-hour day. The main tank holds 8,500 gal. of plating solution, and more than half a ton of cadmium anode is suspended from the bus bars. To serve as a brightener, about 100 lb. of green cane sugar molasses is employed.

This cadmium plating machine takes care of all operations automatically after the work is suspended from the arms of the carriers. These carriers or racks slide on an overhead copper bus, which makes a loop over the various tanks. Cleaning the parts is accomplished in tanks of alkali, acid, and cyanide, hot and cold water rinses being used between each. Following these are the plating tank, the brightening dip, and a hot water rinse. A chain moves the racks from tank to tank, the racks being evenly spaced. Auxiliary chain conveyors are so arranged that when the racks reach the proper point they are lifted out of one tank and lowered into the next. These auxiliary conveyors being mathematically spaced, the work is left in each solution for the proper time. This is especially desirable for the plating operation, as it assures the right deposit thickness on each type of piece.

After the plating process, all work from this machine passes through a brightening dip as part of the auto-



Loading end of the cadmium plating machine. The work is suspended on small carriers, evenly spaced on the chain conveyor

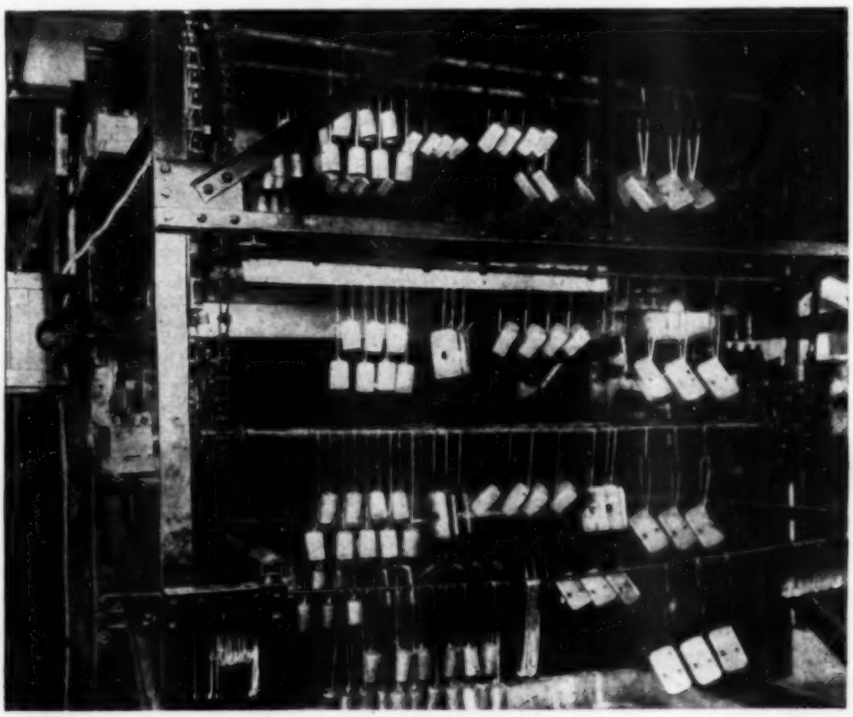
matic operation. This is necessary because cadmium plate is usually frosty in appearance and soils easily on handling. Advantage is taken of the fact that cadmium is attacked by nitric acid. By passing the work through a nitric acid dip, this frost is removed, leaving a bright finish not marred by finger prints.

The second automatic machine that was installed is used for cleaning the parts and applying a priming coat of lacquer. Although the principle of operation is the same as in the plating machine, several details are necessarily different. Instead of suspending work from small carriers, it is hung on rods about 8 ft. long so that a considerable number of pieces are carried at one time. As in the cadmium plating machine, a chain moves the rods to the various operations and auxiliary chains govern the time of each.

After material has been through the various processes, it returns through a drying chamber, which is above the tanks. This chamber is steam heated and ventilated. The speed of the conveyor chains is timed so that material has 30 min. to dry and is ready for use when it reaches the unloading point. This machine will handle 7,000 pieces in an 8-hour day with three men to do the loading and unloading. It occupies a space 18 ft. wide by 60 ft. long and is 10 ft. high.

Returning to the main plating room, there are various other plating tanks in addition to the automatic cadmium machine. Two old semi-automatic tanks have been installed in the new room, one being used for a tin plate, and the other used to cadmium plate copper and brass parts. It is advisable to use this unit rather than to run pieces through the automatic machine with the danger of getting copper into the solution to be used in plating steel.

These are moving cathode machines; that is, the parts are suspended from moving carriers. There are several advantages in a moving cathode machine, among them being the fact that if work being plated is moved with reference to the anodes, it is possible to increase the plating current density considerably without "burning" the plate. This cuts down the time necessary to make a specified deposit and increases the output of



View of the automatic pickling machine from the loading end. The work is hung on 8-ft. crossbars

Adequate ventilating facilities are placed over the cleaning tanks. Overflow from the tanks makes the wooden floor slippery. Lead strips have been applied to reduce accidents

the floor space assigned. The speed of the machine may be set so that one complete circuit of the work gives the proper plate, thus taking this important element out of the hands of the operator.

Electro-cleaning has proved highly successful, and both the automatic plating machine and the automatic pickling machine have been provided with electrical connections for this process. The standard method of removing the oil and grease used during machining processes is to immerse the parts in a hot, agitated, caustic soda solution. In the electro-cleaning process the work is suspended from rods connected to one side of a low-voltage generator, while the other side of the line is connected to the steel tank that holds the caustic soda. As a result, the cleaning time is reduced to about 5 or 10 per cent of the time required when no current is used. This naturally makes a big difference in the length of tank required.

Four years ago much plated work was dried by sifting the finished parts in hard wood sawdust. This is an accepted method in plating rooms, but is unsatisfactory in connection with parts having deep holes, especially if they are tapped, and its use has been minimized. Some pieces with deep holes still have to be blown off with compressed air, but most parts are run through a drier. A homemade affair put into use four years ago has already been superseded by two rotary driers. Each consists of a steam-heated rotating drum, fitted with a spiral so that work is gradually carried from the receiving to the delivering end while being dried. A blower is provided to keep air circulating through the drum. One of the machines is used in connection with work which is barrel plated, and in addition to the drying section, has two other sections that rinse the work with a cyanide solution and with hot water, displacing two operations commonly done by hand. The drying oven of the large automatic machine is served by an overhead chain conveyor.

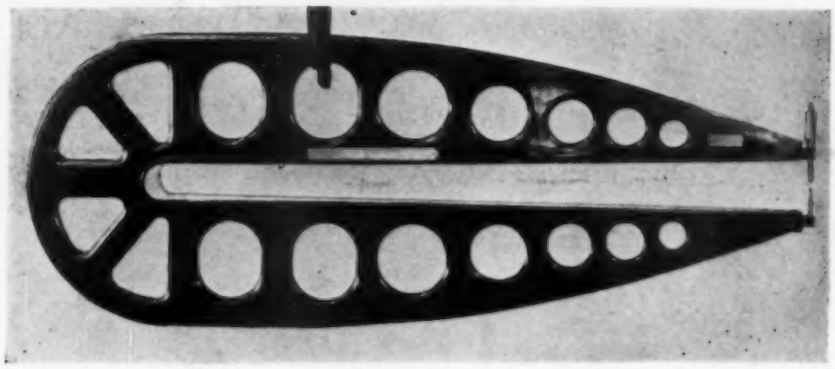
One serious problem in any plating room is the removal of fumes set free by acid baths. The present room is provided with four separate exhaust systems for this work, each to take care of some point where fumes are freed. They are built of wood that has been treated with acid-resisting paint. Each of these systems is especially designed for the job where it is used, with vents spaced to cover the various tanks. The main duct is proportioned so that there is adequate suction at each vent.

The whole floor of the plating room is graded and provided with drains to carry off the water which is continuously overflowing from the tanks used in the cleaning processes, and this area is covered with a wooden grating. In front of some of the tanks the grating is usually wet and often becomes slippery, creating a hazard for the operators. Several methods were tried to make the floor safe. Finally strips of lead were applied, with complete success.

The work of this department is checked at regular intervals by the plant testing laboratory. Pieces are taken at random from the finished work and placed in a fine salt spray. The standard test requires that no sign of rust shall show within seven full days. This periodic checking, which assures that the plating will always be up to standard, has amply justified automatic plating methods.

GOLDEN ANNIVERSARY

To commemorate the founding of the A.S.M.E. a special issue will appear April 3. From its preliminary meeting in the offices of *American Machinist* to the present celebration, the Society's influence on progress will be pictured and described.



An unusually deep-throated micrometer

JIGS IN JAPAN

By FRED H. COLVIN
Editor, American Machinist

THE USE of jigs, fixtures and gages is a sure indication of the appreciation of the problems involved in the manufacture of duplicate parts, whether the quantity be large or small. Such tools show the trend in the products of a country, and the ones shown here indicate that many Japanese manufacturers are appreciating their necessity. For a visit to the shops of the Tsugami Engineering Works, Ltd., on the outskirts of Tokyo, revealed many interesting features, both in its product and in the equipment with which it is provided. While the shop is not large, it is splendidly equipped with modern machinery, much of it being from the United States and from the best-known makers of Europe. Precision instruments for thread measurements were found in abundance, both for thread form and lead. The best methods of securing accuracy were constantly being studied and adopted.

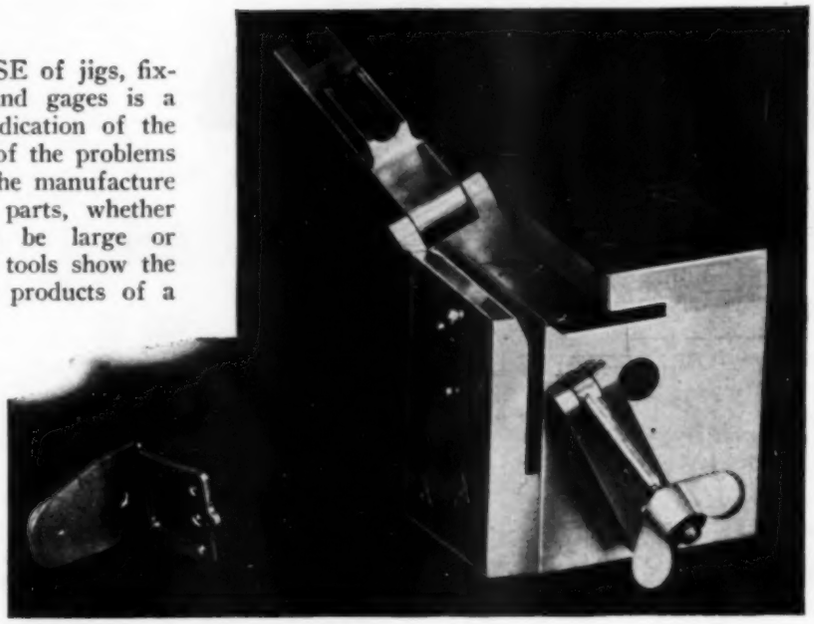


Fig. 1—A two-way jig for drilling an angular stamping. The clamping device is set at an angle so as to draw the work into the proper position

A few examples of jig and fixture work can be seen in Figs. 1, 2, and 3, and they are all excellent examples in their particular line. In Fig. 1, for example, it will be noted that the clamping device is set at an angle so as to draw the stamping at the left, which is to be drilled, into the proper position. The clamp clears the opening, so that the piece can easily be slid into position against a stop. Six holes are to be drilled in the piece, four in the leg at the right and two in the leg at the left. The drill bushings can be clearly seen on the two surfaces of the jig, and it will be noted that rapid handling has been considered in the design.

Two other examples of jig work can be seen in Fig. 2. The jig nearest the stamping is for drilling six holes at one clamping of the work by turning the jig into three positions. By turning the piece so that the small end that is bent at an angle fits into the slot at the right of the jig, the rest of the piece goes inside. The two holes in the bent-up portion at the side are drilled through the bushings to be seen on the top of the jig. Both the jig and the stamping show appreciation of the principles of modern manufacturing. The jig at the right is of similar design, but is used for drilling eight holes in another piece. The same method of clamping is employed in both.

Airplane-engine work is receiving attention in a few Japanese shops, and Fig. 3 shows fixtures for both cylinder and connecting-rod work. The engine in question is a nine-cylinder radial with air-cooled cylinders. Fixtures for cylinders and cylinder heads are to be seen

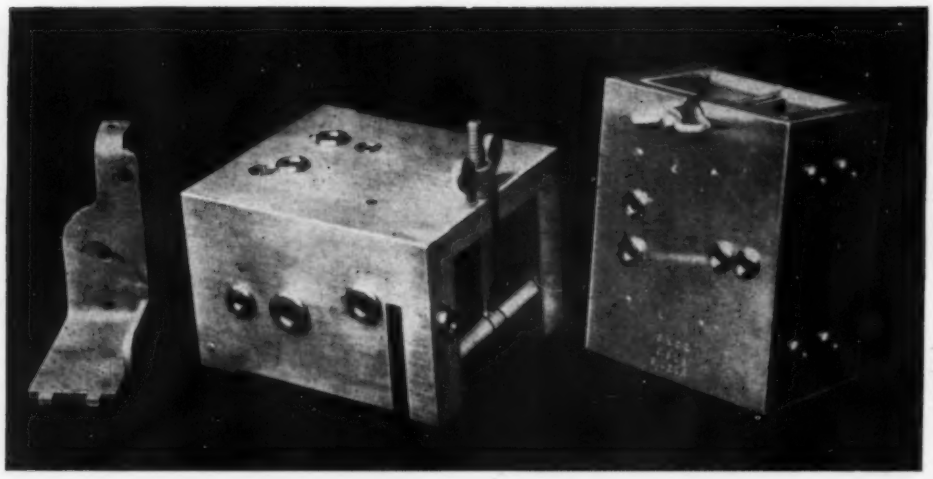


Fig. 2—The jig at the left is for drilling six holes at one clamping of the work by turning the jig into three positions. The jig at the right is for drilling eight holes. The same method of clamping is employed in both

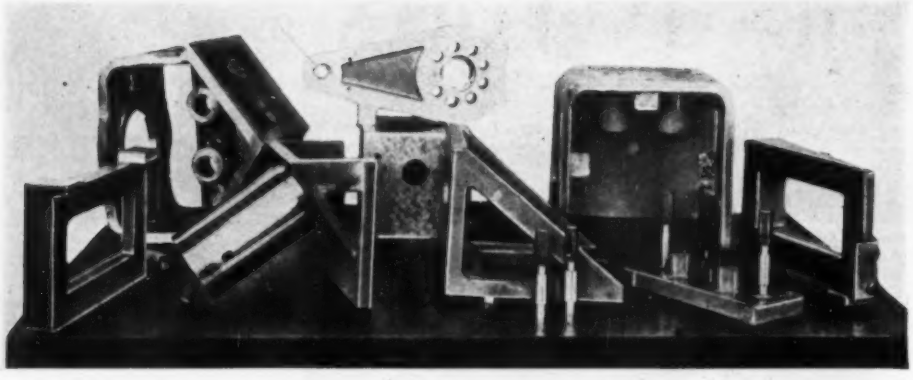


Fig. 3—A collection of jigs and fixtures for parts of an airplane engine having nine cylinders of the radial, air-cooled type

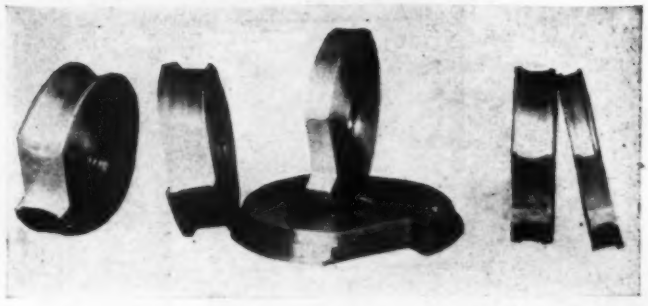


Fig. 4—Form cutters of the circular type for use in automatic and other screw machines and in turret lathes

at the left, while in the center, at the top, is the bushing plate for a jig for drilling the main, or master, rod having eight articulated rods connected to its flange. Here too, modern manufacturing methods have been considered.

In Fig. 4 are a few examples of circular form-cutters for automatic screw-machine and similar work. Gages of various kinds also constituting an interesting part of the work done in this shop can be seen in Fig. 5, where both plain and thread gages of the plug and ring type are shown. The workmanship on these gages is excellent, and accuracy is insured by the use of delicate measuring devices. Another example of similar work is shown in the headpiece. It is a special micrometer having a very deep throat, so that surfaces that would not otherwise be accessible can readily be reached.

The Tsugami shop is one of the few plants in Japan where work of the kind described is the sole product. As a result, the shop is made use of by various parts of the government, the army and the navy, the air forces and the railway, as well as by the manufacturers of talking machines, textile machinery, and other products.

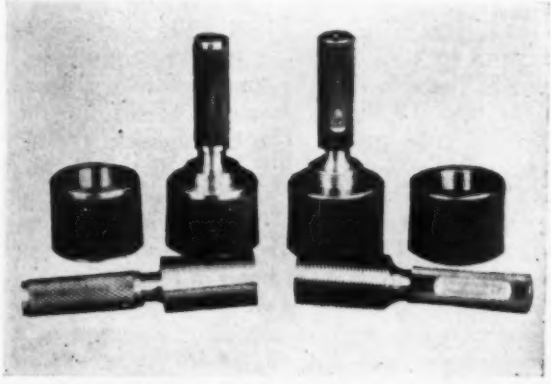


Fig. 5—Plug and ring gages, both plain and for threads. The work on these gages is excellent

Two Methods of Calculating Depreciation—*Correction*

IN THE article on page 702, Vol. 71, under the above title, by F. Trevor Daniel, the second word in the 32nd line, first column, should read "as" instead of "all," that section of the sentence thus being: "(b) transfer as expense out of gross profit into replacement, . . ."

IDEAS FROM PRACTICAL MEN

The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

Punching Shells for Light Sockets

BY S. B. KRAUT
Westinghouse Electric & Manufacturing Company

THE increasing use of 20-amp. circuits and high-candlepower lamps in modern street-lighting practice necessitates the use of sockets that will carry 20 amp., and also withstand a temperature of approximately 300 deg. F. The heat generated in the sockets is a function of the square of the current times the contact resistance between the lamp bases and the socket shells. To overcome possible trouble due to overheating, a new series film socket was designed.

One of the distinctive features of the new sockets is that they have shells with two U-shaped cutout sections, forming two tongues. The tongues are backed up by two shell springs that press on the shells and act as firm grips on the lamp bases. The pressure prevents the lamps from becoming loose in the sockets and, at the same time, decreases the contact resistance, and consequently, the generated heat in the sockets.

Originally, the U-shaped tongues in the socket shells were punched from the outside, leaving burrs on the insides of the shells. This condition was found to be undesirable on account of the limited number of points making contact with the lamp bases when they were screwed into the socket shells. It was decided to eliminate the burrs on the insides of the shells by punching the U-shaped slots from the inside instead of from the outside. To accomplish this change, the tools shown

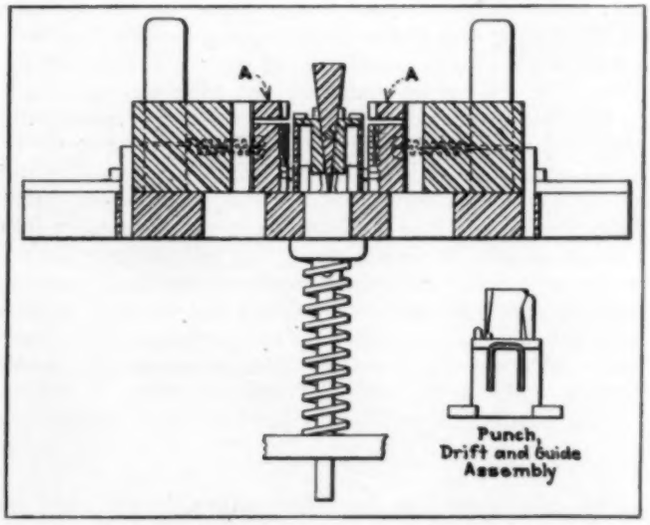


Fig. 1—Sectional view of the die for punching socket shells from the inside

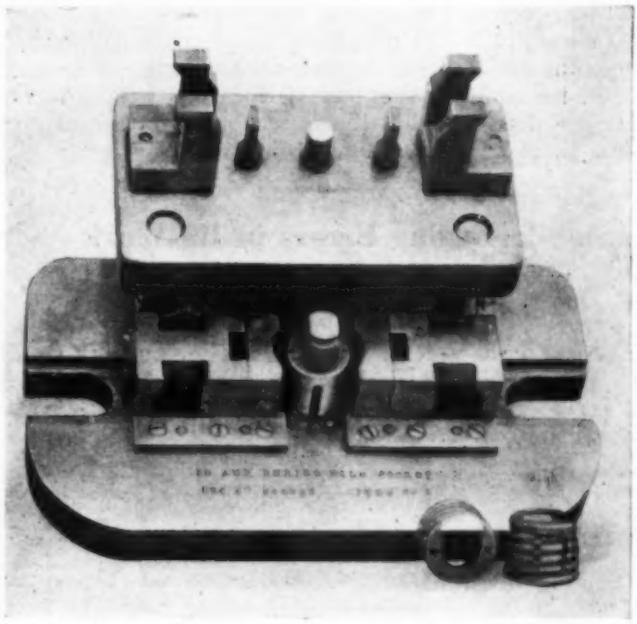


Fig. 2—Photograph of the die. The upper member is turned upside down to show the under side

in both the illustrations were made in our own toolroom.

The blank shells, 0.020 in. thick, are placed over the central member. When the press is operated, an expanding wedge is driven downward, causing the U-shaped punches on the sides to move outward and punch the slots in the shells. At the same time, dies *A*, held back by recoil springs, are moved inward by wedges in the main punch holder, backing up the U-shaped punches.

When the ram ascends, the expanding wedge is moved upward by means of a knockout backed up by means of a compression spring, bringing back the punches. At the same time, the dies *A* are moved outward, releasing the socket shells, due to the action of the recoil springs. It can readily be seen that while burrs are formed on the outsides of the shells, the insides are entirely smooth. Over 100,000 shells have been punched so far with very favorable results, and without having the tools repaired.

Indicating Hardening Temperature by Salt

BY EMIL STUMPP

In making dies, milling cutters, etc., hardening is a difficult operation, especially in small plants having no special facilities for the work. Often, we have to make such tools. We have a home-made furnace for heating

but have no instruments for indicating the temperature. The steel we use has a carbon content of from 0.80 to 1.15 per cent, and requires heating to a temperature of from 1,400 to 1,500 deg. F. for hardening.

We heat the tools slowly and carefully to a dull red and then sprinkle them with powdered rock salt. Then the heat is driven up as quickly as possible until the salt begins to melt, the melting point of salt being 1,472 deg. F. At this point, the required temperature has been reached and the tools are ready to be quenched. The heat should not be shut off until after the tools have been removed from the furnace, as it is important that they be quenched at a rising temperature, rather than at a falling one. The tempering is, of course, dependent upon the use to which the tools are to be put.

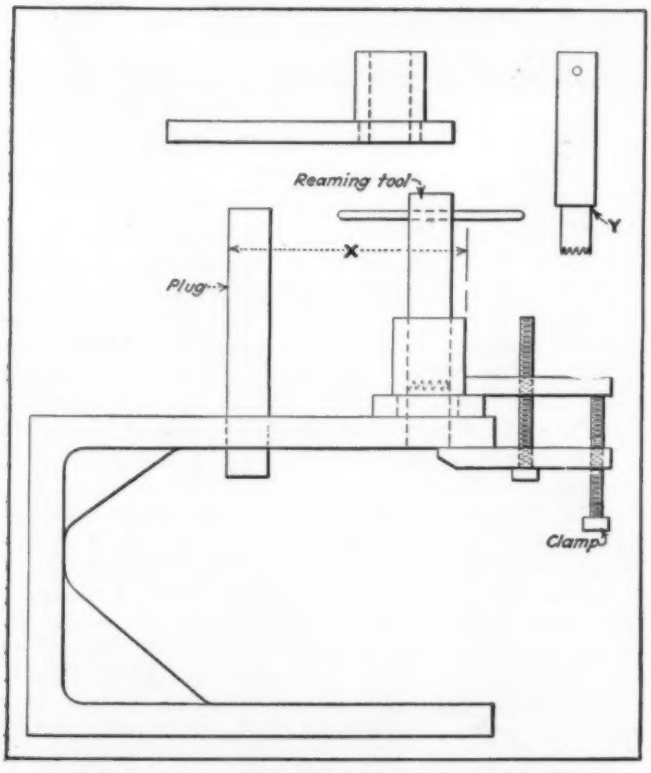
Oil-hardening die or tool steel can be treated in the manner described, but the quenching must be done in oil. In all cases, uniform heating is necessary.

Correcting Errors in Jig Work

By Charles Kugler

General Electric Company, Philadelphia Works

When a slight error is discovered in jig work owing to inaccurate spacing of the holes, considerable time is often consumed in returning large jigs to boring machines for correction. For this reason a pilot was made



A special reamer and bushing are used for slight adjustments of hole positions

of a flat plate provided with a hardened and ground bushing.

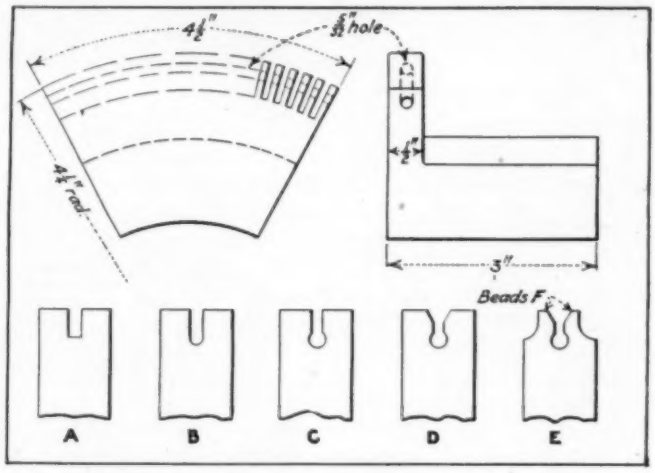
The method of correcting a hole in a V-shaped jig is illustrated. One of the holes, out 0.010 in., was brought to its proper position by placing a plug in an opposite hole and measuring distance *X*. The tool, which may be quickly made by filing teeth in one end and hardening, is used as a reamer. For large, heavy jigs this method has proven to be accurate and a time saver. For some jigs dependent on the size of the holes, it will be necessary to turn the tool down as shown at *Y*.

Another "Bent Hole"

By W. F. Cain

Director, Gilbert & Kellett, Ltd.
Barrow-in-Furness, England

The article by Homer Marion, Vol. 71, page 899 of the *American Machinist* reminds me of a somewhat similar "bent hole," which we had to produce. The illustration shows the segment, five of which were required;



The segment rim was first machined as shown and then spun to form the hole

the hole is $\frac{5}{32}$ in. diameter and is perfectly concentric with the bore and the outside diameter. Each segment had 28 slots, .025 in. wide milled in it, across the edge. The interesting part of the job, of course, is the hole. A forged steel ring was turned and bored, but was made $\frac{1}{4}$ in. oversize in diameter; the rim was then turned by specially ground tools to the forms shown from A to E.

A hardened steel roller was used to turn over or spin the beads F alternately towards each other, that is, to the center of the groove, and lastly down towards the center. Particular note must be made that the roller was made to turn the bead from the root at first. While all the cutting was done with the usual coolant, care was taken to wipe and dry the side of groove before rolling. When the rolling was finished, the edge was machined to the blue print and the ring was ready for milling the slots and cutting into segments. There was some doubt as to what sort of hole, if any, would be found in the segments, but the result was a highly satisfactory round hole. So closely had the beads been rolled or spun into each other, that there was no sign of joint perceptible.

Probably quite a hundred engineers and machine men saw the segments, and not a solitary one was able to suggest how the job was done. The operation of grooving and rolling the edge and the time taken to alter small parting tools to the desired form was about $2\frac{1}{2}$ hours, but the particular operator prepared the tools himself.

All files should be provided with a handle, and no workman should be permitted to use a file without one.

Lubrication of Ball and Roller Bearings

IN THE operation of ball and roller bearing equipment, proper lubrication is of outstanding importance. The kind and quality of lubricant, as well as the system for applying it, must bear a definite relationship to the design of the bearing, the design of the machine, and the conditions of operation.

The problem of lubricating ball and roller bearings may be stated as follows: (1) To support the sliding contact which exists between the cage or retainer and the rolling elements; (2) to support any contact between the races and rolling elements that is not true rolling; (3) to protect the highly finished surfaces of rolling elements and races from rusting and corrosion, and (4) as a secondary function, to assist the housing closure in excluding dirt or other destructive foreign matter from the bearing.

If the operating temperature of a ball or roller bearing exceeds 125 deg. F., ordinary greases will frequently be found unsatisfactory. They will tend to soften and flow continuously into the path of the rolling elements, causing a rise in the normal operating temperature due to the increased frictional resistance introduced and eventually resulting in a separation of the oil and soap base with complete loss of the lubricating qualities. Certain high temperature greases are available, but before using them careful consideration should be given to their suitability for antifriction bearings.

Mineral oil of proper physical and chemical properties is an ideal lubricant for ball and roller bearings when the housing design is properly arranged to control the quantity applied to the bearing, prevent leakage, and protect the bearing from the entrance of dirt or other foreign matter.

The classification of oils given below arranged according to their viscosities as determined by means of a Saybolt Standard Universal Viscosimeter at 100 deg. F., is used in this discussion of lubrication.

Extra light	135- 165 sec.
Light	180- 220 sec.
Medium	270- 330 sec.
Heavy	360- 440 sec.
Extra heavy	450- 550 sec.
Steam cylinder	2,000-2,500 sec.

The viscosity of an oil or the consistency of a grease should bear a definite relationship to the speed of operation of the bearing and operating temperature. When a bearing is run under high temperature conditions, a heavier oil should be used than when the same bearing is run under low temperatures. If too light an oil is used, it may be dissipated from the bearing too quickly by atomizing or evaporation. At high speeds an oil of high viscosity will cause the development of excessive heat; likewise, a grease that is too heavy may channel and fail to lubricate or protect the rotating elements.

The charts are offered as a practical guide for properly selecting oils and greases to meet given operating conditions of load and speed. It is especially important to realize, however, that the success obtained from any lubricant depends in a large degree upon the method or system used in applying it. A few drops of oil or a corresponding amount of grease, when properly distributed or dispersed over the running surfaces of the bearing, will provide satisfactory lubrication for a considerable period of time. The presence of a large volume within a bearing, on the other hand, will usually result in high operating temperatures as a result of the working or churning of the lubricant by the rolling elements and retainer and will impair the useful life of the lubricant seriously. This may be through the oxidation or sludging of oil or actual disintegration of greases.

For speeds below 3,600 r.p.m. on horizontal shafts, it is usually satisfactory with oil lubrication to provide a system that will maintain the level of the oil at about the center of the lowermost ball or roller in a bearing. On vertical shafts some form of flinger is usually employed to raise the oil from a reservoir in the bottom of the housing to the surfaces of the bearing. If grease is used the housing should be not more than one-quarter to one-half full initially.

At speeds above 3,600, control of the quantity of lubricant becomes very important. With oil lubrication different forms of wick feed have been found convenient and highly satisfactory both from the point of view of regulating the flow as well as filtering any incidental foreign matter that may have gained access to the oil supply.

Grease is being used successfully for the lubrication of ball bearings at high speeds, but in order to obtain satisfactory results, great care is necessary, from the standpoint of both the housing design and the selection of the lubricant. Any system used must provide for a limited amount being fed into the bearing. The extent to which dust, dirt, moisture, or other foreign substances may gain access will influence the frequency with which the lubricant must be renewed. Likewise, the operating temperature and mechanical working of the lubricant by the bearing will affect the useful life of a lubricant. In general, the lubricant can be applied and the housing sealed for a period ranging from three months to a year.

The most destructive agents in limiting the life of an anti-friction bearing are dirt and abrasive materials. If these gain access to the bearing housing, the lubricant should be drained or washed out, the bearing thoroughly cleaned, and new lubricant applied.

Oil Lubrication of Ball Bearings Operating at High Speeds

Bearing Load* Pounds	Shaft Speed, R.p.m. 5,000	7,200	10,000	15,000	20,000
10	Spindle oil	Spindle oil	Spindle oil	Spindle oil	Extra light
25	Spindle oil	Spindle oil	Spindle oil	Extra light	Light
50	Spindle oil	Extra light	Extra light	Light	
100	Extra light	Light	Light	Medium	
200	Medium	Medium	Heavy		
300	Medium	Heavy			
	60 mm.	50 mm.	40 mm.	30 mm.	52 mm.
	Maximum Permissible Shaft Size				

Greases are used under these conditions. The suitability of any particular grease in meeting the requirements of service is best determined by actual trial.
*For thrust loads multiply the actual thrust load by 4, and enter the table with this value of load.

Oil Lubrication of Ball and Cylindrical Roller Bearings

Bearing Load Pounds	Shaft Speed, R.p.m. 100	300	600	1,200	1,800	3,600
50	Light	Light	Light	Light	Medium	Medium
100	Light	Light	Light	Medium	Medium	Medium
500	Light	Light	Medium	Medium	Medium	Heavy
1,000	Medium	Medium	Medium	Heavy	Heavy	Heavy
2,000	Medium	Medium	Heavy	Heavy	Ex. heavy	
5,000	Medium	Heavy	Heavy	Ex. heavy		
7,500	Heavy	Heavy	Extra heavy			
10,000	Heavy	Extra heavy				
15,000	Extra heavy	Extra heavy				

Greases may be used throughout the above range provided they are selected to meet the operating temperature of the bearing. The heavier oils are used for the higher bearing temperatures and suitable greases must have a corresponding temperature range. It is suggested that generally a No. 2 grease can be used where a light or medium oil is specified and a stiffer or high-temperature grease where heavy and extra heavy oil is called for.

Courtesy of H. E. Brunner, Chief Engineer, SKF Industries, Inc.

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Inventory Time

"IT WOULD assist greatly during this period if all business concerns would survey their situations as to repairs, clean-ups, and betterments that must be undertaken sooner or later, and have them put in hand now with a view to relieving the immediate distress in their localities."

This sentence from the joint statement on the unemployment situation issued by Secretaries Lamont and Davis a few days ago reiterates the sound sense of the earlier message from President Hoover. When business is dull is unquestionably the best time to clean house and install the needed new equipment. For that reason the *American Machinist* inventory questionnaires now in the hands of works managers and superintendents should be given immediate attention. The best way to find out how much new equipment is required, and how many replacements should be made, is to make a thoroughgoing inventory of existing facilities.

Returns on this questionnaire are coming in at a gratifyingly high rate. If you have one still to be filled out it would be well to have it attended to so that work can be started on the compiling of totals and averages. The Census authorities have promised advance figures on the Census of Manufactures much earlier than has been the case in previous years. To tie in the *American Machinist* figures with those of the Census Bureau complete returns should be in by the first week in April. Accordingly, your co-operation will be extremely helpful, not only to your own industry but to your own plant.

*

It's All in the Approach

TWO documents have just reached the *American Machinist* office—both on the unemployment situation. One is a handbill calling the unemployed to the international Communist demonstration against unemployment in New York on March sixth, now a matter of history. It is the usual blast against capitalism, the trade unions, and the Socialist Party. According to the author there is no hope in capitalism nor in socialism, both of which have failed. The only remedy is to tear them out, root and branch.

The other document is from the American Association for Labor Legislation, an organization that has done much to improve working conditions. It recounts the achievements of the association, and as might be expected, asks for further remedial legislation.

Here are two ways of approaching the same problem. Disregarding for the moment one's personal feelings for or against either of the groups mentioned, aren't these two appeals typical of our present state of civilization? One urges the passing of more laws; the other demands the overthrow of all existing laws. Their views could hardly be more diametrically opposed.

One of the sad things about the evil both are trying to cure is that no one knows its true extent. There is no machinery in the United States that is capable of giving the complete picture. And until that picture is available attempts at remedies are seriously handicapped.

*

Is this Slander?

AT an engineers' meeting a week or so ago a speaker criticised the standard color for machine tools adopted by the National Machine Tool Builders' Association last year. He complained that it was light-absorbing, and that it added anything but cheer to the atmosphere of the shop. Possibly these two objections are justifiable, but what about the third one which was that the bearings leaked so much oil that a dark color had to be used to make the machine less objectionable in appearance?

Is this a fair criticism of machine tool design and construction? Are machine tools any worse, in this particular, than any other piece of production equipment? If they are no worse, should all types of production machines be investigated to determine whether it would pay to make them more nearly oiltight?

These implied indictments of production equipment may be slanderous, but at least they should provide something for the designers and the builders to think about.

SHOP EQUIPMENT NEWS

H-P-M "Hydro-Power" Presses

FAST operation and no necessity for auxiliary equipment are features of the line of "Hydro-Power" presses announced by the Hydraulic Press Manufacturing Company, Columbus, Ohio. These presses can be used for a wide variety of metal-working operations, such as blanking, coining, drawing, embossing, forming, offsetting, punching, piercing, sizing, stamping and straightening. Each machine is a complete self-contained unit occupying less floor space than that of the usual hydraulic press, and no outside source of pressure is required to operate it.

The application of the operating pressure is governed by the "H-P-M" automatic control system. This system provides for a rapid motion of the press slide to the work, a moderate working or pressing speed, and rapid return or opening feed. It makes possible high press production, together with power economy and effective application of the pressure. Furthermore, it is possible to work metals cold in many cases where it would otherwise have to be done hot.

All movements of the press, including the reversal at each end of the travel, are governed automatically. The operator merely starts the cycle by means of a single hand lever or treadle. The control may be adjusted either for semi-automatic or full-automatic operation. With the semi-automatic setting, the press performs one complete cycle and stops, whereas with the full-automatic cycle, the press repeats the entire sequence of operations until the control setting is changed by the operator.

Automatic control of the pressure applied to the work is another feature. As soon as this predetermined pressure is developed, the motion of the slide is stopped and reversed automatically. The initial or starting position of the press is also regulated by automatic control. This may be set for any point within the extreme limits of the available travel. When the press returns to this point, it either stops or again starts forward, according to whether the control is set for semi-automatic or full-automatic operation. An emergency reverse is a standard feature also. This consists of a hand lever conveniently located, by means of which the press can be reversed at any point during its closing stroke. Thus the normal progression of the cycle may be stopped, if on semi-automatic operation, or delayed, if on full-automatic operation, in the event of any emergency, such as stock being improperly located in the dies. In fact, these "H-P-M" presses work to a pressure limit instead of to a position limit. This means that the press cannot be overloaded, even though extra stock is placed accidentally in the dies. Because of this feature the dies and the press are completely protected.

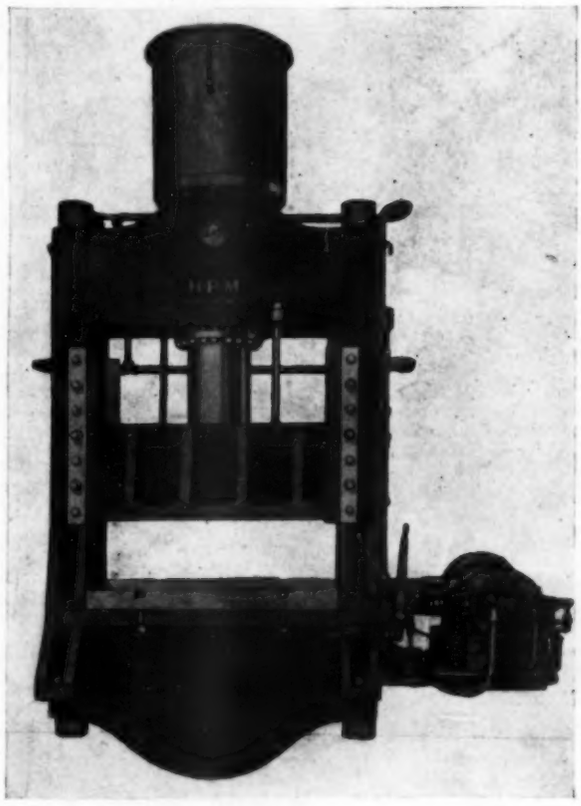


Fig. 1—H-P-M "Hydro Power" Press of the open-side bed type. This machine is available in sizes from 150 to 2,000 tons pressure and the bolster dimensions vary from 60x36 to 216x72 inches

In construction an "H-P-M" press may be divided into three parts: the press frame, the hydraulic press cylinder system, and the press operating equipment. The frame is a regulation four-piece, straight-side type with box uprights and shrunk-in tie rods. Accurate alignment of the main moving member of the frame, the slide, is maintained by long, adjustable gibs.

The press frame is made up of five units as follows: the head, bed, uprights, tie-rods and slide. The head is a steel casting, which contains the hydraulic cylinders through which the fluid pressure is transmitted to the work. The bed is an open-hearth steel casting of heavy deep section, and may be arranged with a large opening through the center to provide space for adding extra auxiliary attachments, such as stripped cylinders, die cushions, or other similar devices. This bed is surfaced with a removable steel bolster plate. Semi-steel castings of hollow box construction are employed for the uprights, which are fitted with gibs front and back. The slide is a semi-steel casting.

Among the parts of the hydraulic press cylinder system are the cylinders attached to the press frame, and rams working in and out of the cylinders. Presses of average size have one main cylinder, whereas those with extra-long slides may have two or more. The ram is a cylindrical casting, smooth finished over its entire length, and moves in and out of the throat of the cylinder. Auxiliary cylinders are employed to traverse

the press slide rapidly to and from the work. Each press is fitted with a pair of these auxiliaries. The main ram and the slide are the only moving parts of the press subjected to the full tonnage load. A tank mounted above the press holds the operating oil. From this tank the main cylinder is pre-filled during the rapid advance of the main ram. The oil exhausted back into the tank after the pressure operation and during the rapid return movement of the ram.

The press operating system consists of several elements mounted on the frame or immediately adjacent thereto. The outfit is strictly self-contained with its direct-connected motor drive. The oil pressure required for the operation of the press is generated by means of a radial high-pressure pump, which has from three to eleven, short-stroke, reciprocating plungers, spaced radially about a single central eccentric. It operates at the full speed of the motor, which is connected to it by means of a flexible coupling. The valve used is a rotary, power-driven type, which is operated at the same speed as the pump crankshaft. All pressure connections and piping are made of extra-strong seamless steel and copper tubing.

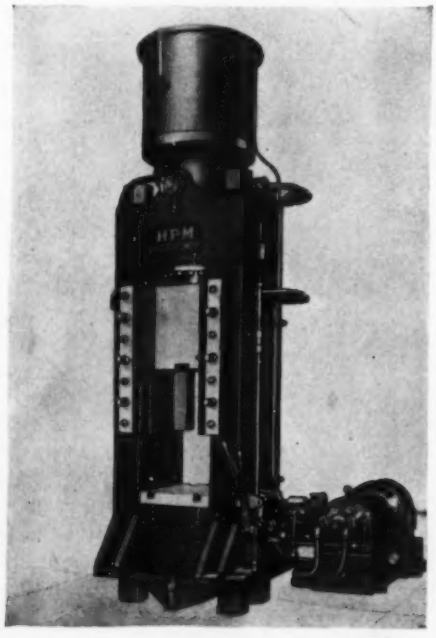


Fig. 2—H-P-M "Hydro Power" square bed type press built in sizes to give 150 to 2,000 tons pressure. The bolster dimensions range from 24x24 to 60x60 inches

The "H-P-M" fast traverse operating system requires only two major elements to provide complete and automatic control of every function of the press. These are the master press valve and the automatic control. The master valve is located within the overhead oil supply tank and is in communication with the main cylinder. The automatic control is attached to the press frame in such a way as to be connected with the master valve and the press slide.

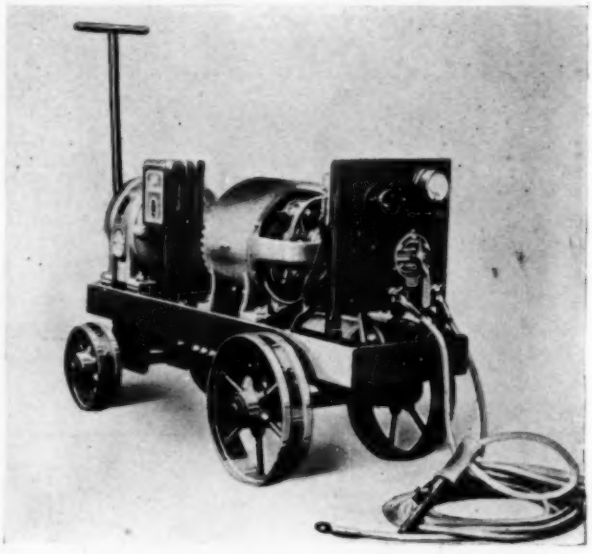
The open-side bed type press, shown in Fig. 1, is available in capacities from 150 to 2,000 tons and bolster dimensions from 60 x 36 to 216 x 72 in. The opening through the bed ranges from 50 x 26 in. to 196 x 46 in. The ram travel varies from 6 to 36 in. in 6 in. increments, and above 36 in. in 12 in. increments. The square-bed type press, shown in Fig. 2, is available in sizes from 150- to 2,000-tons pressure, and the bolster dimensions are 24 x 24 to 60 x 60 in. The slide is 18 x 18 in the smallest size and 50 x 50 in the largest. The standard travel is 18 inches.

Information on weights, floor space, and headroom is not available, but it can be said generally that these three factors correspond closely with those of mechanical crank presses of corresponding sizes and pressure capacities.

Wilson Model S 100-Ampere Welder

A small, lightweight arc welder, suitable for operation in limited space and designated as the Model S, has been placed on the market by the Wilson Welder & Metals Company, Inc., Hoboken, N. J. This machine is mounted on the type 100-W frame and is particularly adaptable for garage work and repair work in general.

The 100-amp. welder has a rating of one hour at full load without more than a 50-deg. C. temperature rise, and has a welding range of 30 to 125 amp. Three models are available; electric-motor driven, gasoline-engine driven, and belt driven.



Wilson Type S 100-Ampere Welder

"Advance" No. 2-H-1½ Combination Grinding and Lapping Machine

Additional features and refinements have been made in the bench-type combination grinder and lapper for tungsten-carbide tools, as manufactured by the Advance Diamond Tool Company, 427 West Congress St., Detroit, Mich. The machine is equipped with wheels driven at the proper speed for roughing, finishing,

Advance No. 2-H-1½ Combination Grinding and Lapping Machine for tungsten-carbide tools

and lapping, and employs two special universal vises.

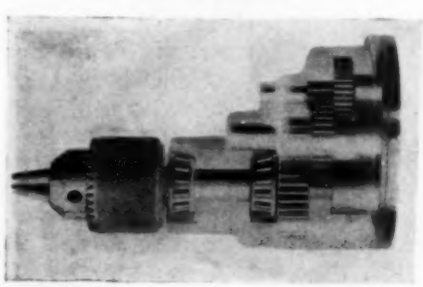
Both ends of this machine are provided with slides parallel to the faces of the wheels, and upon each slide there is placed a cross-slide for moving the universal vise in and out. The tool to be ground is put in the universal vise and the angles are adjusted to the requirements. Grinding is accomplished by operating the slide across the face of the ring-type roughing wheel and then moving it across the finishing wheel. Should diamond lapping be required on the same tool, the light cross-slide and universal vise with the tool mounted thereon may be removed quickly and placed on the slide adjacent to the lapping disk and then finish lapped. The tool remains set up to the proper angle throughout the entire grinding and lapping operations. Either direct or a Texrope drive can be furnished to suit requirements.

Standard equipment includes a cast-iron disk mounted with a 12-in. roughing wheel, another cast-iron disk mounted with an 8-in. finishing wheel, two special universal vises, and one diamoud lapping disk.

Floor space required by the No. 2-H-1½ machine, 30x50 in., approximate net weight, 1,300 pounds.

Improved Chuck Spindles on "U. S." Electric Drills

An additional roller bearing is now being included on the chuck spindles of the ⅝- and ¾-in. heavy-duty drills manufactured by The United States Electrical Tool Company, Cincinnati, Ohio. This construction provides for the double thrust that occurs in cylinder reconditioning work, and means easier operation and longer drill life.



Phantom view of chuck spindle on the "U. S." ⅝- and ¾-Inch Heavy-Duty Drill, showing that an additional roller bearing has been incorporated

Barnes No. 2420 Medium-Heavy-Duty Honing Machine

FOR economically producing smoother finish and greater accuracy of Diesel engine cylinders and liners, locomotive cylinders and other cylinders, a smaller size vertical honing machine, known as the No. 2420 medium-heavy-duty type, has been placed on the market by the Barnes Drill Company, 814-830 Chestnut St., Rockford, Ill. This machine will take cylinders up to 20 in. in diameter and not over 30 in. in length. It has many features that are also standard on the No. 3620 model described on page 235, Vol. 72, of the *American Machinist*.

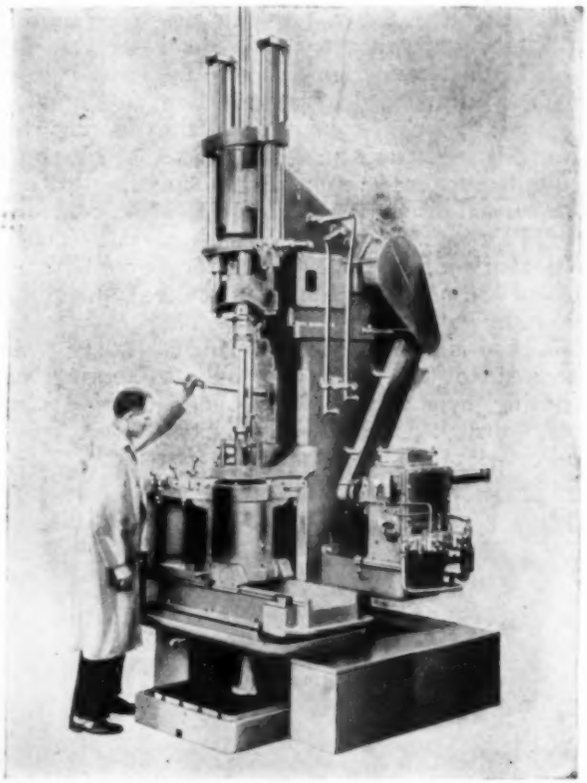
Among the features that are common to both machines is: The use of a rotating and reciprocating, ten-splined spindle, which is hydraulically controlled as to length and rapidity of stroke. The hydraulic operation of the spindle and hone gives uniformity of honing over the full length of the cylinder. The length of stroke may be set for just the right amount of overrun at each end of the cylinder, this feature being important in the prevention of bell mouth, barrel shape, and taper.

It is claimed that large diameter cylinders, if reamed to 0.005 to 0.008 in. of the correct size, may be honed accurately within 0.001 in. Soft steel cylinders, such as hydraulic cylinders, should be smoothly bored or reamed within 0.0015 or 0.002 in. of the size required after honing.

The parallel hydraulic cylinders on opposite sides of the spindle housing minimize height, and permit various lengths of spindle stroke. The yoke connection to the spindle permits of attaching multiple heads when desired. The ten-splined spindle is driven by a hardened-steel, bevel crown gear with an inserted Ackermite bronze hub 7 in. long. Both the hub and the splines are self-oiling.

Four quick-change spindle speeds are furnished, these being 354, 250, 180, and 128 r.p.m. on the machine equipped with 2 to 1 crown gearing, and the speed on the drive shaft being 400 r.p.m. When backgeared, the additional four speeds are 89, 63, 45, and 32 r.p.m. Radial ball bearings and Timken roller bearings are applied throughout the machine, including the spindle which rotates in Timkens.

The control is effected through a combined control lever, which is used for the powerful multiple-disk



Barnes No. 2420 Medium-Heavy-Duty Vertical Honing Machine set up for honing Diesel cylinder liners in a duplex ball-bearing roller fixture

driving clutch that starts the reciprocations. A latch on the lever permits reciprocation of the spindle without rotation of the spindle. Stops on the vertical rod may be adjusted for any length of stroke within the 32-in. travel. A skip-stop provision permits lifting the spindle to the uppermost position, when placing cylinders on the table.

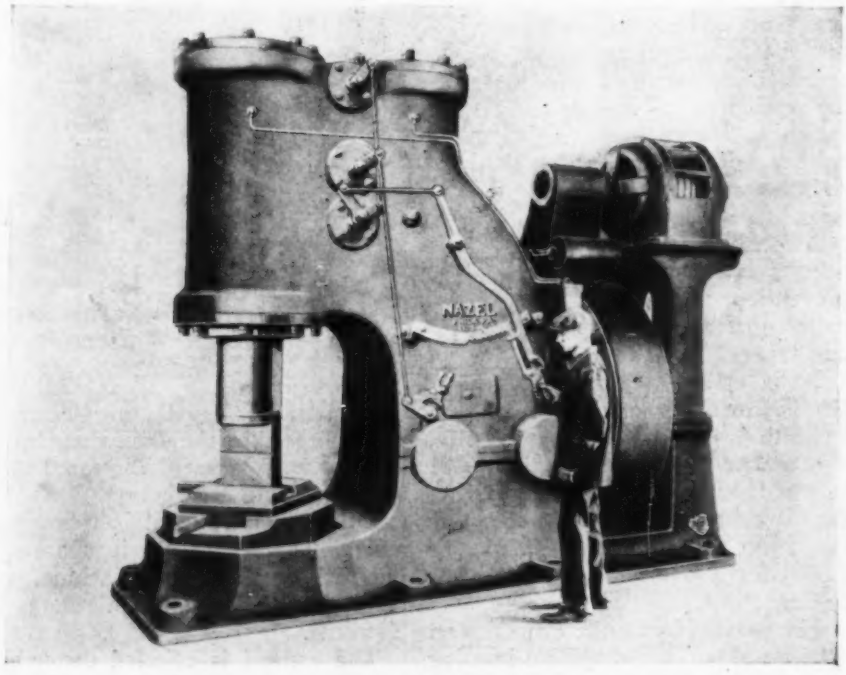
Specifications are as follows: Height of regular machine to extreme top, 12 ft.; distance center of spindle to face of column, 12¼ in.; maximum distance from finished surface of base to nose of spindle, 77¾ in.; maximum distance from top of table to nose of spindle, 64 in.; minimum distance from top of table to nose of spindle, 9 in.; spindle stroke, 1 to 32 in.; size of regular table, 18 x 28 in.; vertical travel of plain table, 23 in.; range of reciprocations, 20 to 50; floor space with filtering tanks, width and front to back, 56 x 64 in.; and net weight with WEA Oilgear hydraulic pump, motor starter, and filter, 6,000 pounds.

Nazel No. 7-B Motor-Driven Forging Hammer

A HEAVY-DUTY forging hammer has been added to the line built by the Nazel Engineering & Machine Works, Philadelphia, Pa. This hammer, which is known as the No. 7-B, will work mild steel up to 10 in. square. The ram has a 32-in. stroke, and distance between the center of the ram to the housing is 30 in. The ram itself is a hollow-bored forging of the plugless type, sliding in a long ram guide to insure rigidity. The baseplate is cast in one piece and is secured to the cylinder frame, or housing, by means of four weldless rings shrunk on bosses on the sides.

A special mixture of gray iron comprises the anvil block, which is separate from the hammer base. It rests independently on the foundation and weighs 21,000 lb. The diagonal forging position renders the dies accessible on all sides, and enables long bars to be worked in either direction across the anvil and clearing the hammer frame. Other features are the noiseless exhaust into the hammer frame, belted motor drive, and automatic force-feed lubrication.

The floor space required by the forging hammer is 158x68 in. The motor required is of the 60-hp., constant-speed type, and the shipping weight is approximately 58,300 lb.

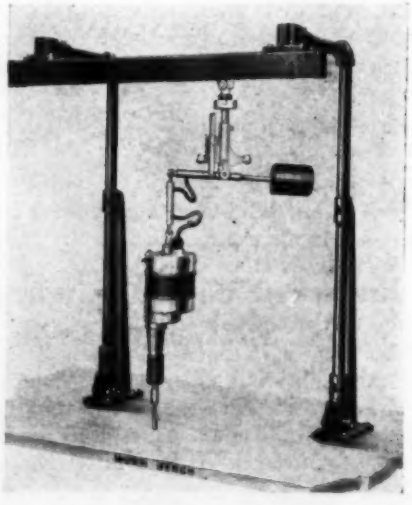


Nazel No. 7-B Heavy-Duty Motor-Driven Forging Hammer

Ray Type CST-B Electric Screw Driver

Another mounting of its electric screw driver, this one being known as the Type CST-B, has been placed on the market by the Ray Machine Company, 5403 West Lake St., Chicago, Ill. The features of the screw driving unit itself are the same as those described on page 1024, Vol. 71, of the *American Machinist*. This mounting is designed especially to facilitate driving screws and nuts over an extended area, such as in assembly work that is constantly moving or where the location of the parts being assembled is continually changing. The location of the operator can be changed or additional units can be mounted on the track without altering or adding to the wiring.

As the screw driving unit is counterbalanced on anti-friction bearings, there is practically no effort required on the part of the operator to center the driver quickly over the screw or nut to be driven.



Ray Type CST-B Electric Screw Driver, which is suitable for driving screws and nuts over an extended area in assembly work

The trolley track is formed of heavy-gage sheet steel, and incloses the collecting strips through which current is supplied to the motor. This track can be made to any required length and is supported by special cast-iron fittings. The screw driver is shown in the illustration as mounted on a bench or conveyor, but

can also be attached to the side wall or ceiling. The trolley is an aluminum-alloy casting mounted on ball bearings, and necessary brushes for taking currents are incorporated.

The bracket supporting the screw driving unit and counter weight is also an aluminum casting, and is suspended on a ball-bearing swivel. Rubber stops for limiting the vertical movement of the horizontal supporting arm and a dampening device are included in the bracket. This bracket has a telescoping vertical adjustment.

The horizontal supporting arm, which is mounted in the bracket on two hardened steel knife edges, can be furnished in various lengths to meet required conditions. The standard length of the arm is 5 in. from the center of the bracket to the center of the screw driving bit, permitting the driving of screws and nuts in an area 10 in. wide and of any length, depending on the extent of the track. The counter weight is adjustable. The vertical arm on which the screw driving unit is suspended is universal in its movements and is so made that the unit can be removed quickly without the use of tools. This arm can also be furnished in any desired length, the standard being 6 in. Black enamel, cadmium plating, and aluminum are used for giving this mounting a satisfactory finish.

Buhr Horizontal, High-Speed Drilling Machine

DRILLING oil return holes in pistons and similar operations can be done in the horizontal high-speed drilling machine announced by the Buhr Machine Tool Company, Ann Arbor, Mich. Either automatic or semi-automatic operation can be employed. When operated with an automatic cycle, the time per cycle is six seconds or a production of 10 pieces per minute is realized. Larger machines have been built, however, the maximum size holes drilled being $1\frac{1}{16}$ inch.

The heads are separate units and can be spaced independently of each other. Up to 14 heads have been employed upon one machine in a single deck, although other types may be had with double decks where holes are to be drilled in two different grooves.

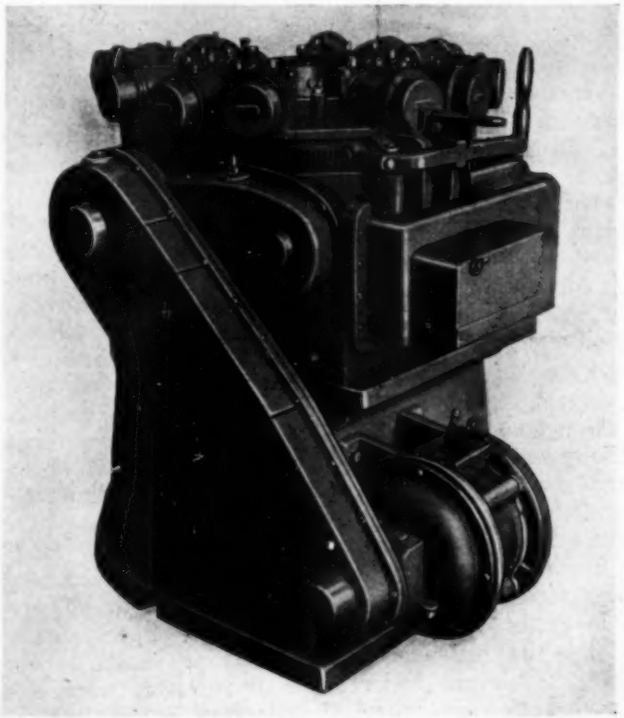
The spindles are driven by a central ring gear and are quickly adjusted for depth by a self-locking feature. All moving parts are mounted on ball bearings and are fully inclosed. Feed is derived from a scroll cam, moving all heads in unison. The cycle consists of rapid approach to the work, regular feed while drilling, and rapid return. For automatic operation, a 3-second dwell is incorporated in the cam, giving the operator ample time to load and unload. The feed may be stopped instantly at any point on the scroll. Pick-off gears are provided for changes in feed.

The machine can be furnished for either straight or angular holes and with either chain or Texrope drive. The motor required is 3 hp. The jig for holding the pistons is easily removed and it is constructed so that, by using interchangeable adapters, oversize pistons may be drilled as readily as standard sizes.

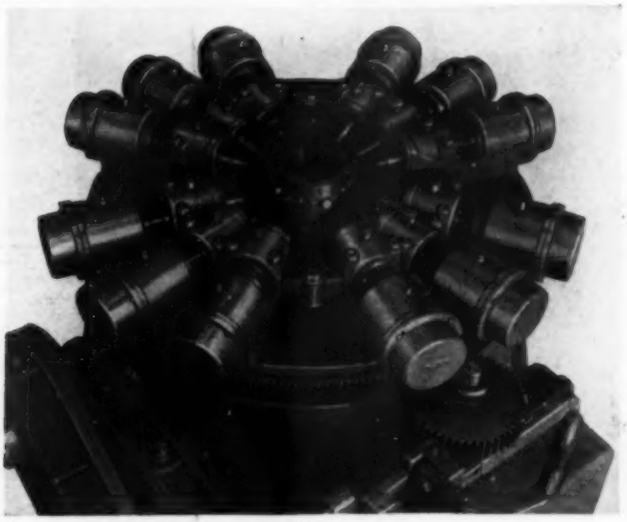
The machine occupies a floor space of 4 ft. square, and it weighs approximately 2,500 pounds.

"Durimit" Floor Surfacing Material

A hard material that may be combined with cement to produce a tough, non-cracking floor surfacing has been announced by Durimit



Buhr Horizontal High-Speed Drilling Machine, which is adapted to drilling oil-return holes in pistons



Up to 14 heads may be mounted in a single deck. The jig is removable and interchangeable adapters may be employed

Floors, Inc., 27 E. Water St., Cincinnati, Ohio. This material, known as "Durimit," is composed of crystals and crystaloids, which according to the Mohs scale, are almost as hard as diamonds. It is said that this flooring will not check nor pit under the heaviest kind of traffic, and neither will it absorb oil or grease. Of further interest is the fact that it does not disintegrate upon heavy abuse, and therefore does not set free dust to menace high grade machinery. It is also waterproof.

Western "Low-Hung-Drive" Radial Drills

THE Western Machine Tool Works, Holland, Mich., has announced a line of radial drills in sizes from 3 to 8 ft. and column diameters of 14 to 22 in. As the trade name, "Low - Hung - Drive," implies, power is applied to the spindle at the large end near the drill and in consequence the torsional strain on the spindle is reduced to a minimum. This construction is shown in Fig. 2. Besides this feature, another is that the base and column are scraped and bolted together to form a rigid unit. The arm is of double-wall section and swings in ball and roller bearings in the trunnions of the saddle. This bracket or saddle is of extra-heavy design and is provided with adjustable gibs.

On the top of the column is placed the speed box, which provides eight changes of speed through gears made of chrome-nickel, alloy steel, heat-treated and hardened. The speed changes can be made quickly while the gears are running by means of the two upper levers. The speed box is of the selective speed-change type, which provides for direct shifting from one speed to any other.

The elevating screw nut is made of bronze and is recessed into and bolted to the saddle. The screw itself is provided with a ball thrust bearing and power is transmitted from the vertical drive shaft through hardened steel and bronze-bushed spur gears. The bracket on the saddle, when engaged with the cams on the elevating control shaft, disengages the elevating mechanism automatically at either extreme end of the saddle traverse.

All gears in the head, including the large bull gear, are made of chrome - nickel alloy steel, heat-treated and hardened. The fast speed in the head is engaged through a friction clutch identical to the reverse frictions. The backgear, or slow speed, is engaged through a jaw clutch and the backgears themselves are of wide face and coarse pitch. All gears are entirely inclosed and run in oil and grease.

Timken tapered roller bearings are used throughout the drill head, and large diameter shafting is also used throughout. The head is regularly furnished with a tapping attachment, which is easily controlled by the ball head lever. All levers and handwheels are within easy reach of the operator. A long bearing at the head of the arm insures retention of alignment and the taper gib provides for taking up wear. The handwheel, by means of reduction gears, provides for the easy and rapid longitudinal movement. A lever is provided within easy reach of the operator for clamping the head on the arm. One lever spindle controls the entire operation of the head by shifting it to any one of four positions. Up and down motion operates the backgears "in" and "out," while the right and left hand motions give the forward and reverse motions to the drill spindle.

Tapping is accomplished through bevel gears on the horizontal drive shaft at the rear of the head. These gears are provided with large expanding ring frictions, which are adjustable for wear. The control is located conveniently at the right hand of the operator in any position, and is of the ball type. A tap may be run in slowly to the desired depth, and then backed out at approximately five times the driving speed.

Several types of drives are available, these being direct-connected motor drive, Texrope drive, and countershaft drive. Special non-reversible radials are available for boiler shops or for plate work. A universal table may be supplied.

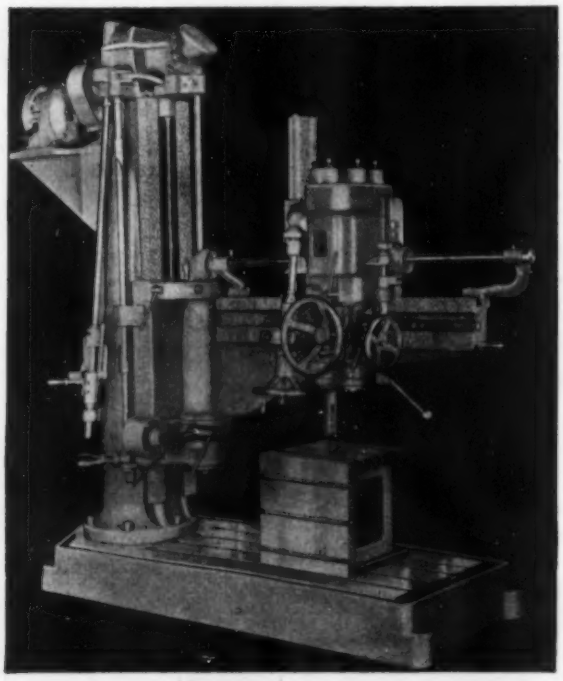


Fig. 1—Western "Low-Hung-Drive" Radial Drill, which is available in sizes from 3 to 8 ft. and in column diameters of 14 to 22 inches

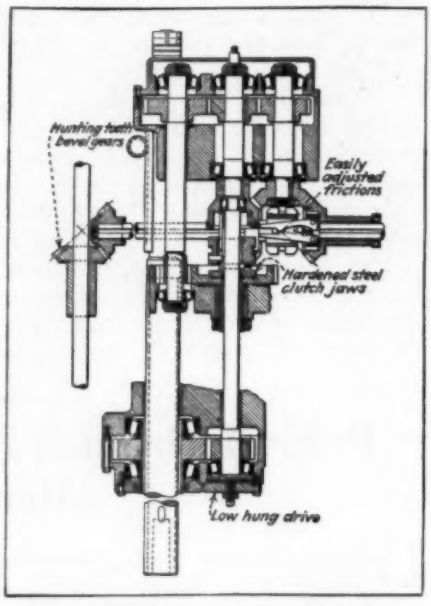


Fig. 2—Torsional strain on the spindle is minimized by the application of "Low-Hung" drive. The large bull gear driving the spindle is slidably connected to it at its large diameter

Terkelsen Electric Molding Machines

TWO different types of electrically driven molding machines have been developed by the Terkelsen Machine Company, Terkelsen Building, 326 A St., Boston, Mass. Although they are both driven by electric motors, the rams are actuated by different mechanisms. In the Type A-1, Fig. 1, the ram is actuated by a toggle. This model is particularly suited to the general service molding of synthetic compositions. The other, Type E-1, Fig. 2, has a ram, in both sides of which a rack is cut. This machine is especially designed to be used by unskilled labor and is manipulated by a push button so that either one or a battery can be handled by one operator.

The Toggle Type

The Type A-1 is fitted with automatic ejectors, enabling the operator to remove the pieces and refill the die with minimum loss of time. Semi-automatic operation insures protection to the mold against careless handling. It can be used also as a manually operated press without delay in changing over. It is entirely self-contained and requires little floor space.

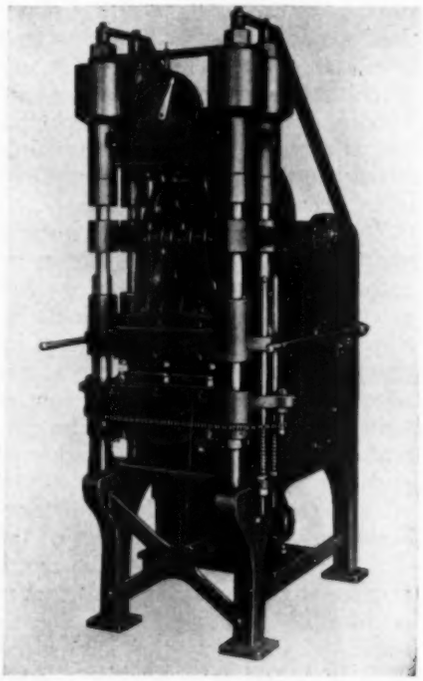


Fig. 1—Terkelsen Type A-1, Model 50, Molding Press, which is electrically driven, and which actuates the ram by means of a toggle. This model is for general service and is fitted with automatic ejectors

The Type E-1 machine may be employed for any kind of synthetic compound in any form and is easy and economical to operate. No power is consumed during the follow-up or curing process, at which period the spring-loaded accumulator assumes the load. Tilting action of the platens is done away with, thus assuring the application of effective pressure throughout the entire area. The machine is noiseless in operation and will stop at any desired position of the travel, upwards or downwards, or at any fixed position, by manipulating a push button.

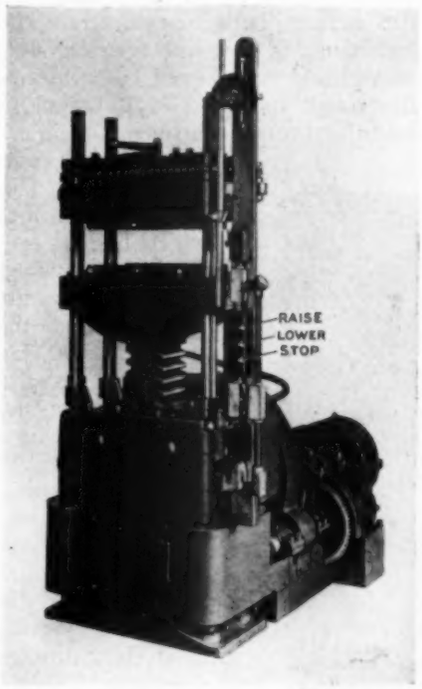
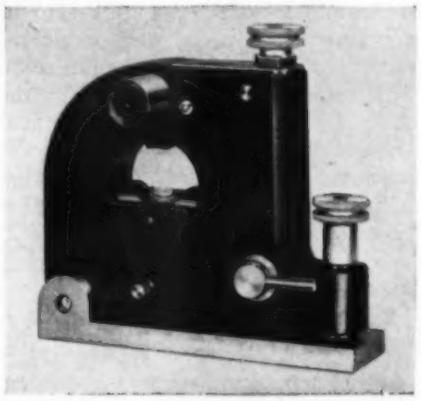


Fig. 2—Terkelsen Type E-1, Model 50 Electrical Molding Press, which is particularly suitable for use by unskilled labor. It is operated by means of a push-button control

Bausch & Lomb Optical Bevel Protractor

For precise work where the usual protractor would not be sufficiently accurate, an optical bevel protractor has been placed on the market by the Bausch & Lomb Optical Company, Rochester, N. Y. It can be used wherever the usual protractor is employed.

The device has an accurately machined base on which the main body is hinged, and can be swiveled by turning the thumb screw at the lower front. The level vial may be positioned accurately around the circular hole in the center of the instrument by revolving the head thumb screw on a worm shaft. The worm drives a graduated dial within the instrument. The worm is held in mesh with the graduated dial by another lever, and by loosening this lever, the dial can be shifted quickly for quick settings.



Bausch & Lomb Optical Bevel Protractor

The dial itself is graduated to one-sixth of a degree, and every degree line is designated by a number. The graduations are observed through the eyepiece, which so magnifies the spaces between the graduations that a vernier can be read with ease to within one minute of arc. The instrument has been found useful for checking dovetail surfaces of machine tool slides, and also making set-ups on surface plates.

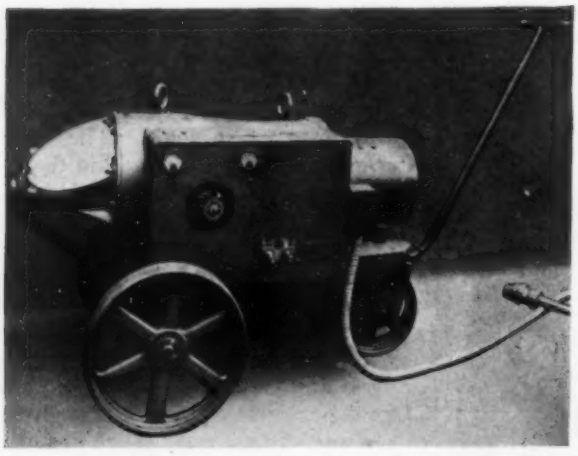
Stanley "Colorgraph" Box Strapping

A great variety of colors may be used or any special design or mark can be readily reproduced on "Colorgraph" box strapping, which has been announced by The Stanley Works, New Britain, Conn. This strapping offers a very effective means of displaying instructions from shippers and effects time and labor savings over the stenciling method. It also advertises the shipper's products.

Westinghouse "Flex-Arc" Welders

By the use of the "Flex-Arc" principle, as applied to its line of single-operator welders, it is claimed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., that with these welding machines it is much easier for the operator to strike and maintain the arc under all operating conditions, and explosive arc characteristics are eliminated. This improvement is obtained by the use of special piece of apparatus known as "Flexactor," replacing the reactor formerly used, and differing in principle of operation from other types of reactors now in use.

The volt-ampere curve of a welding generator indicates a certain current for a given voltage. However, it is a well known fact that such a current is not obtained at all times. In striking the arc, the current exceeds the steady value shown on the curve, causing the troublesome sticking of the electrode. The chief function of the "Flexactor" is to prevent this overshooting of the current and resultant tendency of the electrode to stick. Furthermore, any lengthening of the arc causes the current to drop momentarily below the normal steady value and this is also corrected by the Flexactor. Also, in the arc welding process, momentary short circuits are caused by globules of metal passing through the arc. Such short circuits result in current surges and arc explosions, which have been eliminated.



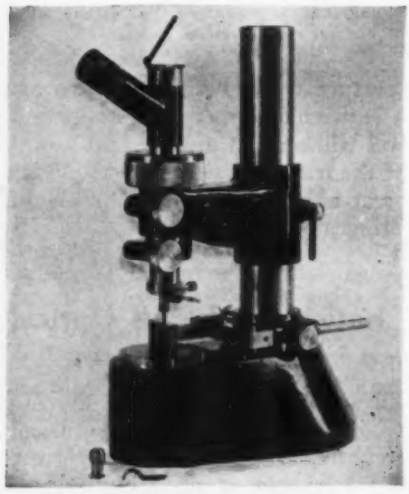
Westinghouse "Flex-Arc" Welder of the 200-amp. rating. A light-weight and compact "Flexactor" is mounted directly under the unit frame

Other features of this machine are drip-proof and compact construction, mobility, wing nut terminals for welding cable connections, and a rheostat adjustment with calibrated dials for adjusting the welding current over the entire range.

Bausch & Lomb Optical Comparator

Accuracy to within 0.00005 in. is embodied in the optical comparator announced by the Bausch & Lomb Optical Company, Rochester, N. Y. This device is used for comparison and measuring purposes on parts with flat surfaces, balls, or cylinders. The instrument is built into a strong steel casing, and is designed to withstand the rough usage to be expected in manufacturing departments.

The optical comparator is supplied in two models, the first of which has an eyepiece which is inclined 60 deg. to the measuring axis, and the other with a 90-deg. eyepiece. It is also possible to supply an instrument with a projection attachment to enable the operator and another inspector to observe the piece at the same time and without the discomfort of peering successively through an eyepiece. This attachment is suitable for the measurement of large quantities of duplicate pieces, because of its convenience and elimination of eye strain.



Bausch & Lomb Optical Comparator

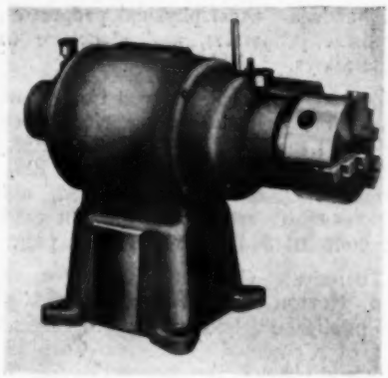
Natural quartz is employed as the material for the anvil, upon which the work is placed. A hardened steel ball $\frac{1}{8}$ in. in diameter is used as a contact point on flat surfaces, while in comparing balls or cylinders, the ball point is removed and an adjustable hardened steel flat piece is put in its place. A fine and coarse adjustment for raising and lowering the contact point has been provided.

In using this instrument the measurements are checked with standards. After the dial is made to register zero by means of the fine adjustment, the standard gage block is removed and the work placed on the anvil. The contact point can be lifted $\frac{1}{32}$ in. above the object, thus making it convenient to place or remove the work. The range of the calibrated scale is plus or minus 0.004 in. Objects up to 6 in. in height can be compared.

"Ideal" Speed Lathe for Polishing Operations

Hand polishing and finishing of small parts can be done as a production operation on the "Ideal" speed lathe, announced by the Schauer Machine Company, Cincinnati, Ohio. Simple design has been employed, and as a result, maintenance is minimized and the only attention required is an occasional oiling.

The lathe embodies a two-speed totally inclosed dustproof motor, an automatic brake, ball bearings, an extension in the motor spindle to take extra long stock, and a 4-in. chuck. High or low speeds are selected by means of a speed control switch in the motor base. The current is cut in by a slight backward push on the hand lever and turned off and the brake applied simultaneously by a forward movement of the same lever. It is claimed the motor can be stopped in 3 seconds when running at the high speed and in about $\frac{1}{2}$ second at the low speed. This brake operates against a large diameter extended surface of the motor spindle. Means are provided for regulating the brake pressure and adjusting the brake shoe for wear.



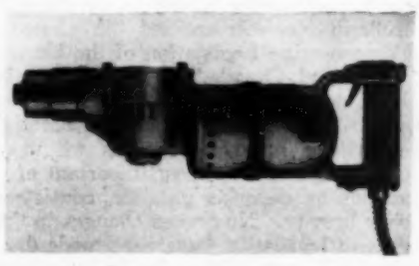
"Ideal" Speed Lathe, which is a production machine for hand finishing and polishing of small parts

The motor employed is of ½ hp. and provides 2,700 and 1,350 r.p.m. respectively, on d.c. and 3,400 and 1,700 r.p.m. on a.c. circuits. The hollow spindle within the motor permits insertion of 1-in. rod or tube stock 9 in. long from the face of the chuck, thus making it possible to finish or polish 12 to 16 in. in length without the necessity of an end support.

The lathe is supplied regularly with a 3-jaw universal chuck to take 1-in. rod or tube stock and to chuck up to 4-in. Double-row ball bearings in dustproof housings are provided on both the chuck and the rear end of the spindle. The speed lathe can be had for bench mounting, as illustrated, or with a pedestal.

"Stanley-Ajax" Electric Hammer

The Stanley Electric Tool Company, subsidiary of the Stanley Works, New Britain, Conn., has announced the purchase of the trade name, stock, tools, jigs, and fixtures of the Ajax Electric Hammer Corporation of New York City, and will continue to manufacture and develop this line in its own plant. In the future the name of this line will be "Stanley-Ajax."



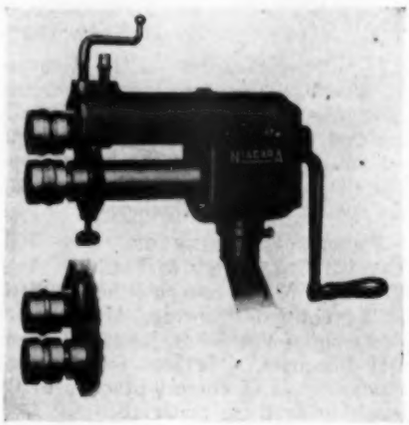
"Stanley-Ajax" Electric Hammer

The hammer illustrated is of light weight and is well balanced. A patented mechanism delivers powerful blows to the cutting tool without the transmission of shock to the motor, the housing, or the operator. Ball bearings are used throughout, and all parts of the mechanism are made from special alloy steels. Among the uses in a metal-working plant are: chipping castings, chiseling wood or steel, and vibrating castings and forms.

The Type 310 hammer weighs 10 lb., and has an over-all length of 16¼ in. It delivers 2,500 blows per minute. The Type 320 is larger and weighs 22 lb. Both of these hammers can be supplied for 110-, 150-, 220-, and 250-volt circuits.

Niagara No. 193 Beading Machine

Beading operations on sheet metal up to No. 22 gage can be performed by the No. 193 beader announced by the Niagara Machine & Tool Works, Buffalo, N. Y. This device has a



Niagara No. 193 Beading Machine, which has capacity to bead up to 22-gage steel

throat depth of 8¼ in., and the rolls are 2⅜ in. in diameter, and the length 1¼ in. A sturdy, one-piece, inclosed frame affords safety for the operator.

The upper shaft is raised and lowered by means of a quick-acting crank screw. All bearings are large and provision is made for easy lubrication. Steel connection gears are machine cut and completely inclosed. They are so mounted that they cannot come out of mesh. Rolls are of case-hardened steel, and are held in place with countersunk screws, keeping the faces of the rolls flush with the ends of the shafts. A polished face gage with large gaging surface is furnished, and is held rigidly in the desired position with a thumbscrew.

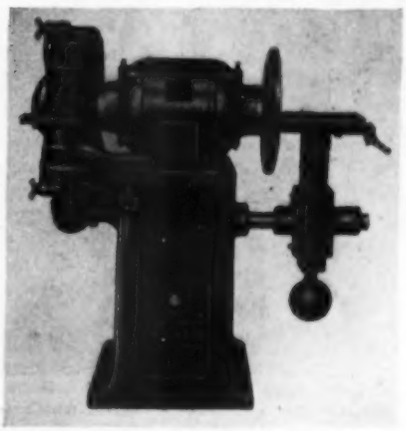
The No. 193 beader is offered complete with one pair of ⅜-in. O.G. beading rolls, one pair of $\frac{5}{16}$-in. single bearing rolls, a bench standard, and a wrench. Single beading rolls $\frac{5}{16}$ in., ⅜ in., or ½ in. in diameter, straight crimping rolls, and spiral crimping rolls can be furnished extra. The weight of the machine ready for shipment is 90 pounds.

"Hisey" Combination Disk and Floor Stand Grinder

By combining a disk grinder and a floor stand grinder in one machine, the Hisey-Wolf Machine Company, Cincinnati, Ohio, has produced a unit of greater than ordinary utility, and of particular value to a small shop. The disk wheel is 20-in. in diameter and the grinding wheel 18 x 3-in. The spindle speed is 1,140 r.p.m., and 5 hp. is required.

The spindle is made of tough steel and is of extra-heavy construction to insure permanent concentricity of the disk. It is mounted on two annular ball bearings, which are subject to thrust loads only. A double-acting, self-aligning, thrust bearing is provided to take all end thrust.

The plain work table has a surface of 9½ x 10½ in., whereas the universal lever feed table has a surface of 8 x 14½ in. Standard equipment



"Hisey" Combination Disk and Floor Stand Grinder

includes one safety combination wheel guard, a 20-in. steel disk, an automatic safety motor starter, and either a plain or a universal work table. The over-all dimensions are 29 x 54 x 51 in., and the weight is 1,300 lb. The grinder is supplied for use on 220-volt, 3-phase circuits, but may be furnished on special order for 2-phase circuits and also for 50, 40 and 25 cycles. Other special electrical requirements can be met.

"Jewel" Die and Tool Grinder

Large savings can be made in the cost of tool and die work with the "Jewel" grinder, according to the Highland Park Tool Co., 3801 Trenton Ave., Detroit, Mich., because it substitutes a fast precision machine operation for the tedious and time-consuming bench operations of filing and stoning. It is claimed that any radius, contour or sweep, either internal or external, can be ground on this machine. Ordinarily the dies are machined to $\frac{1}{64}$ or $\frac{1}{32}$ in. of size and hardened, after which the grinder is employed to remove the excess material. In this way distortion and decarbonization from the cutting edges are taken care of.

"Jewel" Die and Tool Grinder, which is particularly suitable for grinding dies and tools to size after hardening. It eliminates the hand operations of filing and stoning

Adjustments are made easily so that a skilled mechanic is not required. The Jewel grinder operates on either 110 or 220 volts, a.c. or d.c. and uses standard grinding wheels and equipment. It comes supplied with the following equipment: one diamond dresser and four grinding wheels, the diameters being $\frac{1}{2}$, 1, 2 and 4-in., the widths in all cases being 2 in. Two arbors for holding standard cup wheels are also supplied.

TRADE PUBLICATIONS

CONVEYORS, OVERHEAD. The Anchor Steel & Engineering Co., Detroit, Mich., has published bulletin No. 30A, which is entitled "Overhead Conveyor Practice." Theoretical discussion has been avoided in the booklet, and the booklet has been submitted as a practical guide for the executive responsible for the choice of such equipment. The booklet shows views of typical overhead conveyor installations and gives tables of data. It contains 19, 11x8½-in. pages.

MILLING MACHINES. The Kearney & Trecker Corporation, Milwaukee, Wis., has published a circular describing and illustrating its universal vertical milling machine of the bridge type. The diagram of space requirements and the specifications are included.

PAINTS, HANDLING OF. The Hilo Varnish Co., Marcy & Flushing Ave., Brooklyn, N. Y., has published Bulletin M.A., entitled "Storing, Mixing, and Reducing of Varnishes, Japans, Enamels and Lacquers." It sets forth certain fundamentals of correct practice in the handling of these materials.

PICKLING EQUIPMENT. The International Nickel Co., Inc., 67 Wall St., New York, N. Y., has published a booklet containing reprints of advertisements on pickling room equipment fabricated from rolled Monel metal and forgings. Each reprint contains a great deal of material and illustrates special and standard equipment.

STELLITE. The Haynes Stellite Co., Kokomo, Ind., has published a booklet entitled, "Properties of Haynes Stellite," which has been completely revised and brought up to date. It includes additional information which did not appear in previous editions and covers a general description of Haynes Stellite alloys, red hardness, uses, physical properties, chemical properties, and structure of these alloys.

TOOLS. The L. S. Starrett Co., Athol, Mass., has issued Catalog No. 25 on the small tools and sets of its manufacture. Each tool is described and illustrated, various sizes are listed, and various tables are appended. The catalog contains 383 indexed 9x6-in. pages.

TUNGSTEN CARBIDE, GRINDING OF. The Norton Co., Worcester, Mass., has published a booklet entitled "Grinding of Cemented Tungsten Carbide," which discusses the properties of the metal, the grinding problems, grinding resistance, and methods of grinding. Many illustrations are provided. The booklet contains wheel recommendations.

TUNGSTEN CARBIDE TOOLS. The Firth-Sterling Steel Co., McKeesport, Pa., has published a catalog entitled "Firthite Tungsten Carbide," which discusses the application of tungsten carbide to the turning of metals and nonmetallic compounds and its use for drawing dies and gages. Several photographs are given illustrating the methods of inserting tips in various lathe tools.

WELDING RODS. The Fusion Welding Co., 103rd St. and Torrence Ave., Chicago, Ill., has published Circular No. A-43, listing the complete line of welding rods manufactured. Over 40 distinctly different rods to cover every phase of welding have been grouped conveniently to facilitate the selection of the best rod for a particular application. Information on rod sizes, lengths, and other details are included.

IRON AND STEEL TARIFFS. The Advisory Board on Tariffs and Taxation of Canada has issued two records of public sittings on iron and steel tariffs, as of Dec. 12, 1929, and Jan. 22 and 23, 1930. Vol. 3 gives the report on schedules on automobiles and parts, whereas Vol. 4 gives a review of iron and steel schedules. These bulletins may be obtained from F. A. Acland, printer to the King, Ottawa, Canada. The price of each bulletin is 25 cents.

WORKMEN'S COMPENSATION LEGISLATION. The U. S. Department of Labor, Bureau of Labor Statistics, has issued Bulletin No. 496 entitled "Workmen's Compensation Legislation of the United States and Canada," as of January 1, 1929, with the text of the legislation enacted in 1927 and 1928. The material is printed in such form as to make comparisons of the most important provisions as clear as possible, consistent with brevity. Numerous changes in the type of legislation have been made during 1927 and 1928. The bulletin contains 260, 9x6-in. pages.

NEWS
OF THE WEEK

Metal Trades Association Announces Plans for 1930 Convention

STABILIZATION of employment and the leveling of production is being studied by one of our great industrial groups, and a program for attacking unemployment and over-production at its source, perhaps the first effort of its kind, is being planned. Nationally known speakers will present aspects of the problem to representatives of metal manufacturers at the thirty-second annual convention of the National Metal Trades Association, to be held at Hotel Astor, New York City, on April 16 and 17.

L. F. Loree, president of the Delaware & Hudson Railroad, Samuel A. Lewisohn, vice-president and treasurer of the Miami Copper Company and chairman of the board, American Management Association, and E. K. Hall, vice-president of the American Telephone & Telegraph Company, will present the problems of their industries and steps they are taking to meet these basic economic problems.

Floyd Gibbons, famous war correspondent, will tell of "Headline Hunting" at the annual banquet on Wednesday evening, April 18. Commander Edward Ellsberg will present at a convention luncheon the thrilling story of the long struggle to raise the ill-fated S-51 to the ocean surface. A joint meeting with the National Industrial Conference Board on Thursday, April 17, will put the representatives from the 1,100 member manufacturers in the automobile, machine-tool, machinery, radio, and other metal trades industries in closer touch with dominent currents and trends in American industry.

A presentation of superannuation will be the chief feature of a report by the Committee on Industrial Relations. Savings in compensation insurance premiums through cooperation with insurance companies will be emphasized in the report of the Committee on Prevention of Industrial Accidents. The Committee on Industrial Education will present its accomplishments in foremanship training and the progress on its new apprentice training course.

Officers will be elected by the convention. This being the end of two years in their positions, President Harold C. Smith and the other officers probably will retire and be succeeded by others in the line.

Secretaries from the twenty-eight branches of the Association and the staff of the National Office will discuss their problems and plan their activities during April 14 and 15, the two days preceding the convention. Alumni of the Association, composed of former officers and councillors of the Association, a group of 120 men, will hold their annual dinner on Tuesday evening, April 15. Presidents and secretaries of the branches will entertain at a banquet on the same evening.

According to those in charge, the convention should have important con-

HAROLD C. SMITH
Retiring President

sequences for the industries of the nation. Whatever the metal trades are able to accomplish in leveling production and stabilizing employment will greatly affect other industries. If the inventory load may not be largely eliminated, determination as to who shall carry it will contribute much to bring order out of the present chaos in the field of distribution. The problem of the aged employee would, by the superannuation plan proposed, be solved by industry rather than the state through old age pensions or other relief measures. This program is evidence that industry is endeavoring to face its responsibility in the economic problems peculiar to our times and that it believes it can solve them.

* * *

Committee Announced For Western Congress

Golden Gate chapter, American Society for Steel Treating, through its secretary-treasurer, R. S. Hirst, has announced the appointment of committee chairmen for the National Western Metal Congress and Exposition to be held in San Francisco, Feb. 16-20, 1931, as follows: Program—Howard S. Taylor, mechanical engineering department, Stanford University; exhibit—James V. Coulter, district sales manager, Earl M. Jorgensen Steel Co., Oakland; plant inspection—John R. Gearhart, John R. Gearhart Co., Oakland; entertainment—Harold E. Gray, manager of sales, Bethlehem Steel Co., San Francisco; resignation—George E. Batten, manager, Ludlum Steel Co., San Francisco; attendance—S. Graig Alexander, sales engineer, Tay-Hollbrook, Inc., San Francisco. The general committee consists of Ivan L. Johnson, chairman; Frank B. Drake, and Myron Bird.

* * *

Chicago and Cleveland Firms Plan Merger

Stockholders of the Cleveland Wrought Products Co., and the Chicago Nut Manufacturing Co. will meet this week to decide whether or not the companies are to merge. The two are to combine under the name of the United Screw & Bolt Corporation. Officers of the new corporation are to be: chairman of the board, Chas. L. Wasner, Cleveland; president, Everett A. Thatcher, Chicago; vice-president, Carl E. Kramer, Cleveland; secretary, C. C. Brinckerhoff, Chicago; treasurer, V. H. Wilde, Chicago; assistant secretary, G. L. Howard, Cleveland.

* * *

Metal-Working Industry To Have "Radio Salute"

Among the series of subjects included in the Westinghouse Radio Salutes of the Westinghouse Electric & Manufacturing Company, is one to the metal-working industry on March 25. Other salutes include one to the copper industry on May 6 and to the iron and steel industry on June 3. These salutes are broadcast every Tuesday evening over the WJZ network between 10 and 10:30 p.m., eastern standard time.

* * *

EXPORTS to Soviet Russia in January amounted to $12,633,987. Of this total, approximately 90 per cent constituted machinery of various kinds, the principal item being wheel tractors amounting to nearly $4,000,000 and tracklaying tractors totaling approximately $1,600,000, according to the Industrial Machinery Division.

Machinery Exports Hold Up, According to Washington—Unemployed and Why—Is the Machine at Fault—Basic Conditions are Sound—Speedy Census Statistics

By Paul Wooton

Washington Correspondent, American Machinist

WASHINGTON, D. C., March 19—Evidence of the decline in export trade will be presented in the February totals that the Department of Commerce now is compiling. Hopes so confidently expressed a few months ago that a little sales effort in foreign markets would help to take up any slack in home markets are fading. Unless immediately ensuing months present a brighter picture than the trend would indicate, this year's export trade will tend to depress rather than to improve the domestic outlook.

A decline of 15 per cent in the dollar volume of export trade in January from the level a year ago was disturbing, but it was not so severe that hope for improvement was dashed. In February, however, export trade was cut down to such a low figure that it will require heroic efforts to maintain, not to increase export business. The disconcerting point is that the slump embraces practically all important lines of export goods in both the raw material and manufactured categories.

Machinery, musical instruments and motion picture are the only important lines in which sales are mounting. Chemicals, meat, coal, petroleum and paper appear to be holding their own. Otherwise, export trade is slipping severely. The long list of declining totals includes, automobiles, grain, cotton, all textiles, fats and oils, leather, sawmill products, iron and steel, and non-ferrous metals.

At a time when rival estimates of the number of unemployed are hurled back and forth there is increased recognition of the value of the figures which will be furnished for the first time in the forthcoming census.

It is simple to ascertain the number of those employed. Industrial employers for years have been reporting the numbers on their payrolls. This does not tell how many are out of work. In times of greatest prosperity there always is unemployment, but there are no figures to show the extent of this normal unemployment. There is an obsolescence of occupational skill just as there is obsolescence of machinery. In addition, there are a certain number incapacitated temporarily by illness. Each year has its crop of the superannuated. The only way to get these figures is by census methods.

An investigation of the causes of unemployment with particular reference to the part that machinery plays is being contemplated by a subcommittee of the Senate Commerce Committee which is considering three bills introduced by Senator Wagner of New York that bear on the labor situation. While many complaints have been received by members of both houses of Congress, protesting against the inroads that machinery is making in the ranks of the workers, others have communicated views to the effect that increased mechanization of industry is providing new opportunities for employment. Senator Wagner has expressed the opinion that the eventual solution of the problem will be found to exist in regulation of production.

Instead of concentrating on machinery to speed up production, it is contended that the economic situation would be improved if more thought were given to machinery that would produce a better article for the same price. In this manner sales would be promoted without the danger of incurring a piling up of production. Senator Wagner and other Senators interested in the problem believe that much benefit will come from the establishment of actual facts on the part that machinery plays in unemployment. It is believed that the facts will be more effective than general statements in showing the real value of mechanical engineering in promoting industrial prosperity.

Basic conditions are sound. This needs occasional emphasis notwithstanding the fact that the expression long since became platitudinous. Profits of industry are large. Profits of workers are large. Farmers, in most sections, had an income last year that was much above the average.

The farmer has his innings in a period of industrial depression. Things he buys are cheaper. Things he sells are not affected proportionately. In past depressions it has been farmer buying power that has brought industry back. Even now the agricultural machinery industry is doing better than most lines of manufacture and it is farmer buying today that is sustaining the automobile trade.

Since the biennial census of manufactures coincides this year with the decennial enumeration, its scope has been expanded considerably, according to the Bureau of the Census. In preparing for this survey of manufacturing establishments, an Advisory Committee of 25 executives, was named to assist W. M. Steuart, Director, Bureau of the Census, in planning the census and particularly in speeding up the returns.

One of the first matters the Advisory Committee considered, was, "Why are census figures so slow in coming out?" "Although the members of the committee generally supposed the delay was with the Census Bureau," L. S. Horner, chairman of the committee, said, "they discovered that such was not the case. They found that the Census Bureau is able to publish the preliminary report for an industry within three weeks from the time it receives complete and accurate returns from all the manufacturers concerned. The delay is not with the Census Bureau, they found, but largely with the manufacturers themselves."

As a consequence of this discovery, the Advisory Committee is leading in the campaign which is being conducted through the chambers of commerce, business associations, and civic organizations throughout the country, to induce manufacturers to fill out their questionnaires promptly, accurately, and completely.

A proposal for initiating a co-operative investigation of American screw thread practice to determine the extent to which the standards of the National Screw Thread Commission are in actual use will be considered at a meeting of the commission on April 9.

The immediate purpose of the meeting is to consider the revision of certain standards as published in the commission's 1928 report which has been proposed by the sectional committee on standardization and unification of screw threads of the American Standards Association. The technical committee suggests that further consideration should be given to pitches in the fine thread series from one and one-half to three inches in diameter and also proposes an increase in the minor diameter of screw threads of class 1 nuts and the maximum diameter of screw threads of class 1 bolts. Sections of the 1928 report covering standard threads, special threads, and plain and thread plug and ring gage blanks have been separately published. The last report is the work of the American Gage Design Committee.

Progress made in the next year or two will determine whether chromium plating or stainless steel is going to win out, in the opinion of Dr. William Blum of the chemistry division of the Bureau of Standards. Chromium plate is much more expensive than stainless steel for appropriate uses, he said, but it remains to be seen whether it is superior.

Pending preparation of the new federal standard stock catalog, the development of new specifications governing the purchase of materials on the government's account has been practically suspended. All federal specifications that have been issued since 1921 will be included in this volume. Heretofore, they have appeared separately either in mimeograph or printed form and the several departments of the government have reprinted those in which they were particularly interested. The technical committees have been busy but have been prevented from engaging in new work because all specifications issued to date will be presented in a revised form in the new catalog.

French Machine-Tool Industry Anticipates Better Times Despite Uncertainty

By Our Paris Correspondent

MOMENTOUS things which should have a potent effect on French industrial affairs are shaping. Not least of these are the attitude of the government and the outcome of the Naval Disarmament conference. The cabinet change, coming at a critical time, brought in an element of uncertainty which may affect industrial taxation. There are, too, the deductions to be drawn from the Geneva "Tariff Holiday" conference, whereby European countries hope to stabilize tariffs for a two-year period. France is at the moment, however, revising her entire tariff schedule. Industry is by no means in favor of pegging things as they are, or rather as they were, since it is proposed to make this multilateral tariff agreement retroactive to October, 1929.

The steady increase of American machine-tool imports is not believed to be due for an immediate drop. German competition, so marked during the last few years, is perhaps destined for a change. German imports may continue to increase for a time, but an approximate stabilization in volume is looked for. It is recognized that the French business which is attractive to German exporters is that represented by the general utility tool rather than the highly specialized one.

Prices for American machine tools as well as for many others in this market, have risen ten per cent during the past few months. This is also true with respect to many French machines, and to a lesser extent to German ones, and applies in a minor way to British tools. Complaint has been made that American makers are directly responsible for the situation and that they are deliberately curtailing their French market thereby. Some sort of an educational campaign is probably required to combat any false impression if trade volume is to hold up.

Big industries are calm, buying little, apparently awaiting that long-looked-for era of activity. There is a less marked stagnation in the automobile industry. One firm is looking forward and acquiring a range of American machine tools which would have been unthought of five years ago by any but the largest makers. The automobile industry as a whole is, if not in a parlous state, certainly in a quandary as to the best line of development to follow.

The expressed intention of the French government of raising duties on American automobiles and, what is more serious, on automobile parts, has brought French and American authorities to the mat in an effort to thrash the matter out. The subject is still in the negotiation stage and may remain there a long time. There are a number of French automobile makers using American parts and at least one maker of trucks and two of touring cars are fitting American-made engines. It is not difficult to see what may result if an accord is not soon arrived at. Since the application of the proposed tariff will apply to automobiles and parts imported from other countries this will bear equally heavily on Germany, Italy, and America. A joint protest may be looked for to support the American attitude.

The wage scale in the mechanical industries is in a more or less chaotic state with a tendency to rise in exceptional cases. High wages will not increase the general purchasing power. The automobile industry stands alone in giving an example to others. Here the specialist wage is getting nearer 50 francs a day than the traditional 30 francs current for some years ($2.00 and $1.20). The manufacturer who is paying the greater wage takes the stand that it should not be he alone and his few followers who should carry out the principle of an increasing wage scale unless the general buying public is drawing something comparative as the result of its labors. The obvious answer of the machine-tool maker and distributor is that a clean sweep of obsolete machinery and methods will save the situation and reduce prices. But not all manufacturers are willing to see this or perhaps cannot for material reasons.

It is a matter of record that piece-rate wages are impinging on the conventional hourly rate with increased income for the worker and increased output for the manufacturer. It has been long in coming.

A real price factor is looming up as the result of the government's social insurance scheme whereby it is compulsory for the employer to contribute to an insurance fund for the benefit of all workers. It is evident that many manufacturers have anticipated this by increasing their sales prices as shown by revised price lists recently put into circulation. When this comes to be of universal application it will affect living costs from foodstuffs to phonographs. Some suggest that this will amount to a 5 per cent increase, others claim that it will be even more. Living costs have not changed radically since the first of the year but it would seem that the laboring population is already paying more and buying less, which in the long run is bound to act as a trade damper.

* * *

Soviet Plan Two Machine Tool Plants

According to official reports from Moscow, two machine-tool works are to be erected in the Soviet capital during the year, one for the manufacture of cutting tools and one for the manufacture of control and measuring instruments and apparatus. Both plants are to start work in 1931.

In connection with the strenuous efforts made for the erection of machine tool works, a special office for the Russian machine-tool industry has been formed under the name of "Instrumentstroj." A number of Russian engineers and foremen will be sent to Germany and the United States, where they will get in touch with machine-tool experts and study the up to date manufacturing methods of these countries. The State Institute for the projection of new metal factories has completed plans for the Charkow tractor works.

* * *

Auto Materials Topic For A.S.T.M. Discussion

Automotive materials were discussed in several papers which were presented at the regional meeting of the American Society of Testing Materials, held at the Book-Cadillac Hotel, Detroit, on March 19. T. O. Clements, technical director of the research laboratories of the General Motors Corporation, was chairman. C. F. Kettering, vice-president and general director of the General Motors Research laboratories, was the toastmaster at the dinner. Subjects of the papers included: methods in production of cast iron, sheet steel, corrosion-resisting and heat-resisting steel, die-cast metals, bearing metals, and molded plastics.

* * *

MACHINE knife manufacturers have been authorized to hold a trade practice conference with the Federal Trade Commission. No time or place has been determined for the meeting but Commissioner Charles H. March has been named to preside. Among subjects to be discussed are: Price discrimination, commercial bribery, interference with contracts, breach of contracts, false and misleading statements, threat of suit, enticement of competitor's distributors, competitive bidding, terms of sales, orders and contracts, shipment on trial, special designs, and definition of terms.

* * *

AT THE annual convention of the Mountain States Hardware & Implement Association, recently held in Denver, Colo., the following officers were elected: President—J. H. Schroeder, Cheyenne, Wyo.; first vice-president—E. W. Hanson, Denver; second vice-president — George O. Roberts, Clovis, N. M.; and secretary-treasurer —W. W. McAllister, Boulder, Colo. The following board of directors was named to serve during 1930; R. L. Patterson, Fort Morgan, Colo.; J. O. Turner, Nunn, Colo.; H. W. Ross, Montrose, Colo.; and A. M. Rhodes, Yoder, Wyoming.

BUSINESS · BAROMETER

Many reports of the unemployment situation are colored by political expediency; a gradual improvement indicated

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

THE question whether there is more unemployment than usual in the United States is being widely discussed. It is impossible to be precise, but the prevalent view of the facts is generally an exaggeration and the number of those who are without work is probably overstated. Some highly-placed government officials say that there are three million jobless wage-earners in the United States at present. They may be correct but it is quite possible that three million persons are always unemployed in this country. In good times we do not hear of their idleness because there are few pessimists to proclaim it, but when the tide has turned the workless advertise themselves in the hope of obtaining help from charitable individuals or organizations. Those industrial workers who have learned to take a winter holiday are also becoming numerous, and it is quite possible that many of them are idle today by choice.

No doubt there has been some reduction in the number of those who are industrially employed, but there are 120,000,000 people in the United States and of this number 3,000,000 would be less than 2½ per cent. This is not a large proportion of the total, nor would it be surprising if it represented about the normal of unemployment in a country where the labor turnover is as large as it is in the United States and where there are so many who are temporarily idle by choice rather than by necessity. There are, for example, a great many modest winter residences in Florida, California, and Arizona occupied by farmers from New England and from the Northwest during the cold weather.

Briefly stated, these are the writer's reasons for believing that the unemployment has been exaggerated and that it is being exploited for political purposes rather than out of a sincere desire to correct conditions which are less aggravated than some seem to believe. The same general statement is true in respect of bank clearings and of car loadings. Both are running under last year but the reduction in bank clearings is almost entirely due to the subsidence of stock speculation, and is chiefly apparent in the clearings at New York, which immediately reflect the activity or the inactivity of the Stock Exchange. Car loadings for the week ended March 1 showed a decline of about 9 per cent under last year's figures, which amounted to 978,301. But of this decrease of 79,012, nearly 72 per cent (or 56,916) were represented by coal cars, which are less used because hydro-electric energy and long-distance transmission of power are displacing the black diamonds that used to be converted into steam power. Similarly, motor truck transportation has diminished the number of cars loaded in almost every industry.

These statistical details are brought out to emphasize the need of care and research in interpreting the business news from week to week. By a touch here, and a touch there, it is possible to brighten the sunshine or deepen the gloom. Industry is a shade less active, but evidence of a prolonged or acute business depression is hard to find, and the decline in agricultural commodities is almost the only serious feature.

The week's news from the industrial and commercial centers does not indicate any important change in business conditions. One well-informed merchant says that distributors are buying goods but saying nothing, and he adds that such buying generally indicates that men of sagacity think prices are low enough.

The steel trade is a trifle slower. Automobile production is about unchanged. At the decline the demand for cotton goods showed some improvement. Coffee and sugar are gradually attracting investment buying. So is rubber, and the decline in silk has led the Japanese Government to follow the example of the United States in offering to advance money on the surplus supply of silk that weighs upon the market. The woolen trade was at first shocked and then reassured by the action of the largest manufacturer in slashing its inventories. The feeling now is that the industry has been put upon a sounder basis and that it will yield better profits in the near future.

Thus far there is no evidence of any increase in the construction of new buildings, and it must be admitted that real estate mortgages are hard to sell, and that the New York building trade is not as active as it was a year ago. But money rates have been reduced again, and the Federal Reserve policy as shown by the reduction of the New York rediscount rate and purchases of bills and securities is to make credit abundant.

Viewing the outlook inclusively, it seems safe to assume a gradual improvement in business for the next few months, with a subsequent and unmistakable resurgence of optimism if the Government is successful in maintaining and advancing the price of farm products. The effect of failure might be exceedingly depressing, but Uncle Sam is not in the habit of abandoning experiments of this sort.

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From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page

OPINIONS of machinery and machine-tool dealers of the entire country agree in at least one respect, judging from their reports of the past week. There has been little change for the last several weeks, although the market tone is claimed to be getting better momentarily. The situation is one of watchful waiting, with purchasers buying only what they absolutely need, holding off on the other items "until the situation eases." The net result is stalemate, for the situation cannot ease until some hardy soul starts the procession.

RAILWAY EQUIPMENT orders are coming in increasing numbers in the Canadian market. The next six months are expected to bring much better business there. New York dealers are getting little results from efforts, although there are some structural, subway, and building orders, and all agree that the situation looks considerably brighter than it did a few weeks ago. New England orders are for single units, with the majority for smaller items, small machine shops doing a large amount of the buying.

CINCINNATI district demand is fair, single tools predominating in orders. Manufacturers expect to remain busy for some time to come. Southern District is quiet, with inquiries from Texas paving the way for better conditions. Railroads have for the most part filled their needs, and little activity is expected from them for some time. Chicago inquiries and orders are for single items, agricultural implement and tractor builders being the principal buyers. Used tools are not in demand there at this time.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

CANADA

Machinery and machine-tool manufacturers in all sections of Canada report a steady increase in demand for their products. The quickening of activity in the mining and waterpower fields and the comparatively large volume of orders for railway equipment and rolling stock are the principal factors in the improved condition of the market. Tenders for new railway equipment valued at about $5,000,000 have already been called for by the Canadian Pacific Railway in connection with its 1930 expenditure program. Equipment orders so far announced by the Canadian National Railway are approximately $20,000,000.

Taking the metal-working industry as a whole, first quarter business has been slightly below the record of 1929, but the indications are that the next six months will witness a notable improvement in all branches of the industry, in common with bettered conditions in other industries.

The iron and steel industry continues busy on a wide variety of contracts. Bridge building and heavy construction work is increasing. Sheet metal mills are operating in excess of the usual winter production rate. Automobile, automobile accessory and agricultural implement plants are operating below the level of last year. Officials of the Canadian Locomotive Company report that they have entered their new fiscal year with six months' locomotive business on the books and a larger volume of extra orders than at any time in the history of the company.

NEW YORK

New England's proverbial, conservative attitude seems to have become that of machinery and machine-tool buyers in the New York area. Inquiry departments are as busy as ever, but salesmen have little to show for the leather worn from their shoe soles in the last three or four months. Everyone predicts better times as soon as things "loosen up" and insists that the only thing lacking is someone to start things going; yet no one is willing to take the initiative. The result is a stalemated tool market, in much the same condition as it has been since the stock market scared the dabblers.

One dealer reports a good week and a good month, with sales to structural, building, subway, and export interests. Other sales of the week are single items, to general manufacturers, and of no particular type or size. Shops are adding men to their payrolls and are busy, much of the business, strangely enough, coming from the Detroit area. This is true in particular of the Cincinnati Milling Machine Co., and the National Automatic Tool Co., which report good-sized orders for modern replacement equipment from the area that is supposedly so quiet. The D. L. & W. list remains unclosed, but closing is predicted for the present week. Deliveries and prices are as they have been, and are expected to remain so for some time.

NEW ENGLAND

The tone of the New England machine-tool market during the week reflected improvement without showing any outstanding purchasers, or large orders. Sales of small tools were at a better level. Orders were for single units with a dearth of heavy-duty machines. Small machine shops and metal manufacturers were fairly conspicuous in the buying, with an assortment of miscellaneous tools which in the aggregate represented a reasonable total.

The demand for lathes, drills, and presses held to the promise of a week ago, and further improvement is looked for in this line. A scattering of machinery orders were placed by the automotive industry. Most of these were for replacement purposes, and definite buying programs against a large inquiry volume has not yet materialized in this section.

Aeronautical buying is quiet. A few tools are being bought for airport equipment, but manufacturers have not been in the market. Contractors' equipment and road-building machinery are selling well. Inquiries for a wide list of machinery are noted from all parts of the country; and, while most of these are for single machines, the total would be impressive. Because of these inquiries the situation is one of optimism.

CINCINNATI

Machine-tool manufacturers of the Cincinnati district report fair demand, with very little change from the previous week. A few reported that business is picking up, and these expressed optimism as to the immediate future. On the other hand, a few stated that there was a slight recession in the week and expressed some fear that the market will be slow in its recovery. Orders now booked, together with those that will flow in from day to day, will, it is thought, sustain production at a fair level for some time to come.

There was no business feature in the week, and the sustaining factor continued to be the sale of single tools and replacements to general machinists and miscellaneous users. Orders booked came from all sections of the country and were well diversified as to sizes and types of requirements. A few orders were received from railroads and from the automotive industries, but in each case the requirements were small.

In speaking of the inquiries coming in, a manufacturer made a statement which seems to reflect the views of the entire trade. "We are constantly receiving a large volume of inquiries," he explained, "but entirely too small a percentage of them are becoming orders." On first thought it would seem that a fine amount of immediate business is developing, but at this particular time it is not safe to make that assumption. As a matter of fact, under the present market condition the receipt of a large number of inquiries merely means that a large amount of unproductive sales effort must be made." Selling agents report that in the past week their sales continued to be at a fair level, with practically no change from the previous week. A large amount of business is pending in local and adjacent territory, it is stated, and while there still is much hesitancy as to making commitments, it is thought sales resistance gradually is diminishing.

SOUTHERN DISTRICT

Machine-tool business in this district showed a slight improvement during the past fortnight, and while January business was somewhat off as compared with the last months of 1929, February volume was generally reported as above the preceding month, and anticipated business for March together with fair orders already received indicate a still further improvement among the trade. Nearly all principal points east of New Orleans were quiet during the past two weeks, but unexpected inquiries from Texas, particularly in the Houston district, helped pave the way for a satisfactory condition throughout the central territory. While railroads have become inactive buyers as the result of having for the most part filled their needs, scattered inquiry from mills and power plants has been satisfactory.

Several fine programs in the Birmingham district hold a promising future for the trade. The Alabama Power Co. has lately announced that $250,000 will be expended in and about Mobile, and work is steadily going forward at the plants of the Gulf States Steel Co. at Gadsden. Florida, however, shows no promise of immediate improvement, while several new industrial plants in Mississippi have aided there. There has been relatively little inquiry from machine shops, and in not few instances forces have been pulled up. Used-tool business continues to dominate the market, while prices for new tools in several instances were reported higher with deliveries better.

CHICAGO

Practically no change in machine-tool market conditions during the last week is reported by manufacturers' representatives and dealers. It had generally been expected that with the advent of March an improvement in the matter of increased sales would have taken place, but from all accounts there still exists among industrialists a desire to defer closing just as long as possible. Notwithstanding this situation, inquiries show no decrease in number, and it is largely for this reason that those who manufacture and sell machinery continue to believe that in the near future the curve of business unquestionably will take a definite and satisfactory upward turn. Most of the Western railroads have closed on the principal items contained in their lists, only a few scattering units of lesser importance remaining to be bought. Inquiries from this source now have dropped to single tools and small lots. Agricultural implement and tractor builders still continue as factors in the market, though in a lesser degree than a month ago. The general sluggishness in the machinery market, concerning which there are no two opinions, is reflected by the rather sharp decline in the demand for used tools reported by dealers.

Business Items

A $3,000,000 assembly plant will be built in the South End industrial district of Seattle, Wash., by the Ford Motor Co., according to announcement of R. W. Hinea, Seattle branch manager of the company. The site of the new plant is waterfront property between East Marginal Way and the Duwamish Waterway, covering an area of 30 acres. It is planned to have the plant in full operation by the early part of 1931. Tentative plans call for a 1½-story concrete and steel structure approximately 300 ft. wide and 800 ft. long, with dock and warehouse adjoining.

The Rheem Manufacturing Co., Oakland, Calif., recently acquired the Western Steel Package Co., Pacific Coast branch of the O. E. Niedringhas Co., St. Louis. This makes the second plant absorbed by the Rheem Manufacturing Co. in the past 60 days, the Republic Steel Package Co., of Richmond, Calif., being the first. The Western Steel Package Co. plant is located in Oakland, California.

The Motch & Merryweather Machinery Co. has been appointed exclusive representative for the Federal Press Co., Elkhart, Ind., in the Cleveland, Cincinnati, and Pittsburgh territories. A complete stock of Federal presses will be carried in the Cleveland warehouse of the Motch company.

The Cushman Chuck Co., Hartford, Conn., has announced five new officials. James J. Jordan becomes second vice-president, A. Boyd Sloan becomes treasurer, Edward L. Field assistant treasurer. G. H. Pratt was named assistant to the president and George Highberg was appointed superintendent.

The Rose-Hoskins Supply Co., Houston, Tex., has been appointed distributor for Fafnir transmission equipment, to cover the Houston territory, according to announcement by the Fafnir Bearing Co., New Britain, Connecticut.

Officers of the Nu-Way Corporation, Rock Island, Ill., were re-elected at the annual meeting last week. C. E. Campbell is president; Morris K. Cruise, vice-president; Carl A. Hallgren, treasurer; and T. A. McGuire, secretary.

Change in the name of the General Instrument Corporation, Los Angeles, Calif., to Commercial Instrument Corporation has been announced by Herbert E. Linden, vice-president.

Personals

CYRIL AINSWORTH, formerly director of the Bureau of Industrial Standards of the Pennsylvania Department of Labor and Industry, has been appointed to direct the national safety code work of the American Standards Association, according to an announcement by WM. J. SERRILL, president. JOHN WILSON MCNAIR, formerly of the standards department of the A.I.E.E., and CLARENCE E. DARLING, formerly of the staff of the A.S.M.E., have also been added to the A.S.A. staff.

L. BISHOP has been elected president of Globe Forge & Foundry, Inc., Syracuse, New York, succeeding the late W. Charles Lipe. Mr. Bishop was formerly vice-president and treasurer. F. W. STRICKLER is secretary and treasurer and E. LAWTON BISHOP is purchasing agent.

CLAYTON R. BURT, vice-president and general manager of the Pratt & Whitney Co., Hartford, Conn., has been elected president. Pratt & Whitney is a subsidiary of Niles-Bement-Pond. Mr. Burt succeeds J. K. CULLEN of Hamilton, Ohio.

ROY CARNOVSKY, for 14 years head of production at the Fisher Body Co., Plant No. 18, Detroit, has been named superintendent of production of the Limousine Body Co., Kalamazoo, Mich., a subsidiary of the Auburn Automobile Company.

H. E. COLWELL, formerly Michigan representative of Thompson-Braddock, Inc., Cleveland, has been promoted to chief engineer.

DR. KARL T. COMPTON, head of the Department of Physics at Princeton University, has been appointed president of the Massachusetts Institute of Technology. He will take office in July when DR. SAMUEL W. STRATTON, who is to become chairman of the executive committee, takes his office.

DR. HARVEY N. DAVIS, president of Stevens Institute of Technology and a member of the executive committee on the A.S.M.E. Fiftieth Anniversary, will talk on the progress made in mechanical engineering during the last fifty years during the broadcasting of "Collier's hour" on Sunday, March 30.

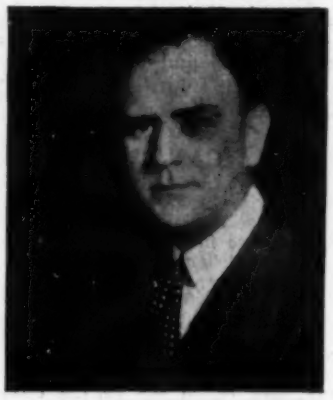
O. W. ELLIS, director and metallurgical research engineer of the Ontario Research Foundation, Toronto, Canada, addressed the Philadelphia Foundrymen's Association at its meeting on March 12 at the Manufacturer's Club, Philadelphia. Mr. Ellis chose as his subject "High-Strength Brasses."

L. H. EMRICK, 424 Book Bldg., Detroit, Mich. has been appointed district sales representative for the Despatch Oven Co., 116 First Ave., North, Minneapolis, Minn., in the Toledo territory and in the state of Michigan with the exception of a few counties near Chicago.

H. P. EVANS, Pettibone Mulliken Co., Chicago, has been re-elected president of the Chicago Foundrymen's Club.

CHAS. S. FREDE has been made works manager of the General Steel Castings Corporation, St. Louis. He has been in charge of production since 1918. HARRY E. ROGERS, superintendent of the finishing department since 1913, has been made Mr. Frede's assistant. HARRY PHILE, formerly superintendent of the pattern department, has been made superintendent of the core and foundry department. B. F. VARNUM, associated with the company for 20 years, has been appointed assistant to HARRISON HOBLITZELLE, vice-president and general manager. GILBERT F. CLOSE, formerly assistant to the president, is now director of relations.

PAUL J. KALMAN was made chairman of the board of Bliss & Laughlin, Buffalo, at a recent meeting of the board of directors. Walter Howell was made president and general manager, W. P. Mitchell, vice-president, and Howard H. Hersey, was re-elected treasurer. Mr. Kalman is widely known throughout the industry and business world through his connection with many large corporations. Mr. Howell, who was formerly vice-president of Bliss & Laughlin, reaches the presidency after a meteoric rise through many departments of the industry.



Walter Howell

R. G. HARRIS, formerly Pacific Coast manager of the General Cable Corporation, with headquarters in San Francisco, has been appointed manager of the Denver office. Mr. Harris is in charge of the activities of all divisions of the General Cable Corporation in that territory. The title of Pacific Coast manager having been abolished, C. G. Gauntlett, Pacific Coast sales manager, has taken over Mr. Harris' duties, with no change in title.

C. H. JENSEN, formerly with the Pittsburgh Branch of the Byllesby Engineering & Management Corporation, Chicago, has become affiliated with the engineering staff of the Copperweld Steel Co., Glassport, Pennsylvania.

DAN W. JONES has resigned from the presidency of the Universal Aviation Corporation, St. Louis. COL. HALSEY DUNWOODY, executive vice-president, is acting as head of the company.

JOHN W. KAISER, formerly president of the Phoenix Manufacturing Co., Joliet, Ill., was made chairman of the board at the annual meeting on March 4. EDWARD N. GOSSELIN, who was vice-president and general manager, was made president, and M. F. O'CONNOR, who was Eastern sales and export manager, was made vice-president.

P. LLOYD LEWIS has been transferred from the Kansas City branch office of

the Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, to the home sales office, where he has been placed in charge of the merchandising division. He has been connected with the Wagner company since 1911.

GEORGE J. LYNCH has been appointed district manager of the new branch office at Tulsa, Okla., established by the Chicago Pneumatic Tool Co., New York City.

E. D. MACGILLIVRAY was elected to the newly created office of assistant secretary of the Baldwin Locomotive Works, Philadelphia, Pennsylvania.

JOHN M. MANLEY, executive secretary of the National Metal Trades Association, Cincinnati branch, has been awarded an honorary certificate for his services and ability as a teacher of conference foreman in the metal trades. He has been factory foreman of the Lunkenheimer Co. for many years and is widely known as a lecturer on the training of foremen. He was vice-president of the Association last year.

S. J. MENZEL will supervise the general stamping department which has just been organized by the Briggs Manufacturing Co., Detroit, according

to an announcement by GEORGE D. WILSON, president. Mr. Menzel was formerly manager of sales of the Mullins Manufacturing Corporation, Salem, Ohio.

JESSE W. OTT, formerly vice-president of the Wisconsin Machinery & Manufacturing Co., Milwaukee, has been elected president to succeed the late WILLIAM H. VOGEL. O. W. BROWN succeeds Mr. Ott as vice-president, and LOUIS E. VOGEL continues as secretary and treasurer.

H. D. PIERCE, formerly with the Udylite Process Co., Detroit, has been made general manager of Protective Metals, Inc., Tulsa, Oklahoma.

F. B. RENTSCHLER, president of the Pratt & Whitney Aircraft Co., Hartford, Conn., and the United Aircraft & Transport Co., New York, has been elected a member of the board of directors of the National Aviation Corporation.

LEO WEAVER, assistant to the president of Schill Bros. Co., Crestline, Ohio, has resigned to become manager of the Lewisburg Foundry Co., Lewisburg, Tennessee.

D. G. WILLIAMS, formerly with Cincinnati Grinders Inc., Cincinnati, has been appointed chief engineer with the Green Bay-Baker Machine & Tool Works, Green Bay, Wisconsin.

Obituaries

HERMANN BLOHM, founder and senior partner of the world-famous shipyards of Blohm & Voss, builders of the new liner *Europa*, died on March 12 at his home in Hamburg, Germany, at the age of 82. Blohm & Voss were also the builders of the *Leviathan*, which was the *Vaterland* of the Hamburg American Line before the World war, and of the *Imperator*, now the *Berengaria*.

WILLIAM A. CUDLIPP, former auditor of the Yale & Towne Manufacturing Co., died at his home in Rowayton on March 11, after a long illness. He was 75 years of age and was an employee of Yale & Towne for 43 years until failing health compelled him to retire about four years ago.

NATHAN B. MARKLE, 72, director of the American Chain Co., Pittsburgh, died recently in Columbus, where he was office manager. He had been identified with the iron and steel industry for more than 60 years.

MAX T. MORRISON, 51, head of the tramway department of the American Steel & Wire Co., Worcester, Mass., died on Feb. 27 at Charleston, W. Va., of heart disease. He was a member of the A.S.M.E.

CHARLES A. ANTHONY, Elizabeth, N. J., general purchasing agent of the Metal Package Co. of New York, died on March 10, at his home, after a brief illness.

G. CURTIS WILLIAMS, 69, engineer for the Pennsylvania Works of the National Tube Co., Pittsburgh, for 28 years, died recently at his home in that city.

FRANK PAUL JOHNESS, 70, owner of the North Side Foundry, 537 Collins Ave., Columbus, Ohio, died in that city on Feb. 26.

GEORGE F. SMITH, inventor, and president of the George F. Smith Oven Co., Inc., Baltimore, Md., died on March 10 after an illness of a month.

A. D. SHARP, 65, president of the Ohio Foundry Co., Steubenville, died in New York on March 9.

Forthcoming Meetings

STEEL FOUNDERS' SOCIETY OE AMERICA—Regular March meeting, Statler Hotel, St. Louis, Mo., March 27.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Fiftieth Anniversary celebration. Opens in New York, April 5, afternoon in Hoboken; April 6 in New York; April 7, 8, and 9 in Washington, D. C., at the Mayflower Hotel. Calvin W. Rice, 29 West 39th St., New York City, secretary.

AMERICAN WELDING SOCIETY—Annual meeting at Society headquarters, New York City, April 22-25. M. M. Kelly, 33 West 39th St., New York, is secretary.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—General Cost Conference at Hotel Cleveland, Cleveland, Ohio, April 22-23. E. F. DuBrul, 1415 Enquirer Bldg., Cincinnati, is general manager.

NATIONAL POWER SHOW — Held in connection with the International Textile Exposition, Mechanics Bldg., Boston, Mass., April 28 to May 3. For information write to New England Association of Commercial Engineers, 53 Devonshire Road, Boston.

AMERICAN FOUNDRYMEN'S ASSOCIATION — Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, May 12-17. C. E. Hoyt, 222 W. Adams St., Chicago, is secretary-treasurer.

NATIONAL FOREIGN TRADE COUNCIL —Convention at Hotel Biltmore, Los Angeles, May 21-23. O. K. Davis, 1 Hanover Square, New York City, is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS —1930 Summer Meeting, French Lick Springs Hotel, French Lick Springs, Ind., May 25-29. National headquarters are at the Engineering Societies Bldg., 29 W. 39th St., New York City.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Semi-annual meeting, Hotel Book-Cadillac, Detroit, June 2 to 12. Calvin W. Rice, 29 West 39th St., New York City, is secretary.

NATIONAL ASSOCIATION OF FOREMEN —Convention at Toledo, Ohio, June 6-7. Harry J. Baumker, 316 Tenth St., Toledo, is convention secretary.

STEEL INDUSTRY'S EXECUTIVES—Annual Iron & Steel Exposition. Under the sponsorship of the Iron & Steel Electrical Engineers, June 16-20, Broadway Auditorium, Buffalo, N. Y. John F. Kelly, 1010 Empire Bldg., Pittsburgh, Pa., is managing director.

AMERICAN SOCIETY FOR TESTING MATERIALS—Annual meeting, Haddon Hall, Atlantic City, N. J. June 23-27. C. L. Warwick, 1315 Spruce Street, Philadelphia, is secretary-treasurer.

STEEL FOUNDERS' SOCIETY OF AMERICA—Semi-annual convention, Greenbrier Hotel, White Sulphur Springs, Va., June 26-27. G. P. Rogers, 932 Graybar Bldg., New York City, is managing director.

INTERNATIONAL CONGRESS FOR GENERAL MECHANICS — Liege, Belgium, Aug. 31 to Sept. 7. For information address Alb. Schlag, 4 Place Saint Lumbert, Liege, Belgium.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

PRICES tend downward in most of the principal shop materials, with scarcely a notable exception. Steel sheets, tin, lead, zinc, solder, and several descriptions of scrap dropped sharply in price as compared with Mar. 7 levels. The general level is below that of a year ago, except in the case of either oils or abrasives. Automotive production is at half its rate of a year ago. This is perhaps the main reason why steel mill operations have dropped 3 per cent in a week, to 76 per cent of capacity, against 94 per cent at this time last year.

(*All prices as of Mar.* 14, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	15.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76@22.26
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20.26
Basic	20.26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10	3.35†	3.30	3.60†
No. 12	2.15	3.45†	3.35	3.65†
No. 14	2.25	3.55†	3.45	3.70†
No. 16	2.35	3.65†	3.55	3.80†
Black				
Nos. 18 to 20	2.45	3.85†	3.55	3.55
No. 22	2.60	4.00†	3.70	3.70
No. 24	2.65	4.05†	3.75	3.75
No. 26	2.75	4.15†	3.85	3.85
No. 28	2.90	4.75†	4.00	4.00
Galvanized				
No. 10	2.60	3.90†	3.80	3.80
Nos. 12 to 14	2.70	4.00†	3.90	3.90
No. 16	2.80	4.10†	4.00	4.00
No. 18	2.95	4.25†	4.15	4.15
No. 20	3.10	4.40†	4.30	4.30
No. 22	3.15	4.45†	4.35	4.35*
No. 24	3.30	4.60†	4.50	4.50
No. 26	3.55	4.85†	4.75	4.75
No. 28	3.80	5.10†	5.00	5.00

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	53.74%	41.2%	55.5%	43.5%	55.5%	42.5%
3½ to 6 in. lap	50.32%	37.78%	53.5%	40.5%	51.6%	39.0%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches External	Diameter in Inches Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	.154
⅝	.58½	2.875	2.469	.203
¾	.76½	3.5	3.068	.216
⅞	.92	4.0	3.548	.226
1	1.09	4.5	4.026	.237
1¼	1.48	5.563	5.047	.258
1½	1.92	6.625	6.065	.28
2	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

Thickness — Decimal Fractions	B.w.g. and	Outside Diameter in Inches ⅛	¼	⅜	½	¾	1	1¼	1½
		Price per Foot							
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23	
.049"	18	.17	.18	.19	.20	.21	.23	.25	
.065"	16	.19	.20	.21	.22	.23	.25	.27	
.083"	14	.20	.22	.23	.24	.25	.27	.29	
.095"	13	.21	.23	.25	.26	.27	.29	.31	
.109"	12	.22	.24	.26	.27	.28	.30	.32	
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33	
.134"	10	.24	.26	.28	.29	.30	.32	.34	

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	3.75†
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00†
Cold drawn, round or hexagon‡	3.40	3.65	3.60
Cold drawn, flat or square‡	3.90	4.15	4.10
Structural shapes	3.30†	3.00	3.10†
Soft steel bars	3.25†	3.00	3.00†
Soft steel bar shapes	3.25†	3.00	3.00†
Soft steel bands	3.75†	3.65	3.20†
Tank plates	3.30†	3.00	3.10†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, $\frac{3}{16}$-in. thick by ¼-in. wide. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— $\frac{3}{32}$, 8.35c. per lb.; $\frac{1}{8}$, 7.85c. per lb.; $\frac{5}{32}$ to $\frac{1}{4}$, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			39.50@40.50
Lead, pigs, E. St. Louis	5.50	New York	7.00@7.50
Zinc, slabs, E. St. Louis	4.95	New York	6.50@7.50

	New York	Cleveland	Chicago
Antimony, slabs	11.00@11.50	11.87½	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.75@11.25	12.25	10.11
Solder (½ and ½).....	29.25	27.50	26@28
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			57.00
Commercial genuine, intermediate grade.....			42.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt, f.o.b.....			11.50

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, not rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	14.75 @15.25	13.50	14.00 @14.50
Copper, heavy, and wire..	13.50 @14.00	13.00	13.00 @13.50
Copper, light, and bottoms	12.00 @12.25	12.00	12.00 @12.50
Heavy lead.....	4.37½@ 4.87½	5.25	3.50 @ 4.00
Tea lead.....	2.87½@ 3.12½	3.25	2.50 @ 3.00
Brass, heavy, yellow.....	7.75 @ 8.00	8.00	7.25 @ 7.75
Brass, heavy, red.....	11.25 @11.75	12.50	10.25 @10.75
Brass, light.....	6.25 @ 6.75	7.00	6.25 @ 6.75
No. 1 rod-brass turnings.	9.00 @ 9.25	8.00	8.00 @ 8.50
Zinc.....	2.50 @ 2.75	3.00	2.00 @ 2.50

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	16
Sal soda, per lb.....	.02¼	.02	02
Roll sulphur, per lb.....	.028	.03½	04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.146	.164	152
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.75	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt..	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.034	.034	.035
Brass rods.....	per lb..	.2125	.2125	.215
Solder (½ and ½).....	per lb..	.2925	.2975	.3475
Cotton waste, white...	per lb..	.13	.13	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1, 6-in. dia.....	per 100.	4.59	4.59	3.59
Lard cutting oil.....	per gal.	.75	.65	.55
Machine oil.....	per gal.	.33	.33	.33
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50–10%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....		Connellsville,	2.60
Coke, prompt foundry, per net ton.....		Connellsville,	3.50@4.85
White lead, dry.....	100 lb. kegs ...	New York,	13.75
White lead, in oil.....	100 lb. kegs....	New York,	14.25
Red lead, dry.....	100 lb. kegs....	New York,	13.75
Red lead, in oil.....	100 lb. kegs....	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, $\frac{7}{16}$-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$8.50
Cast iron welding flux, per lb., net.....	.35
Brazing flux, per lb., net.....	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Ind., Anderson—Ames Shovel & Tool Co., 3 Court St., Boston, Mass.—machinery and equipment for the manufacture of shovels for proposed 1 story, 100 x 600 ft. factory at Ames and Crystal Sts. here. Estimated cost $75,000.

Mass., Cambridge (Boston P. O.) — School Dept.—machinery and equipment for manual training department for new school on Harvard St.

O., Berea—H. L. Bailey, 110 Seminary St., automatic sawfiling machine.

Wash., Seattle — American Can Co., Elliott and Vine Sts.—machinery and equipment to cost $250,000 for proposed 3 story, 140 x 550 ft. factory at Railroad Ave. and Vine St. Total estimated cost $1,250,000.

Opportunities for Future Business

Calif., Berkeley — Byron Jackson Co., 2150 East Slauson Ave., manufacturers of oil and deep well pumps, awarded contract for the construction of a 1 story, 70 x 180 ft. assembly plant at 7th and Carlton Sts. Estimated cost $40,000.

Calif., Los Angeles—Rex Clark, 727 West 7th St., and W. C. Archibald, 1722 West 50th St., et al., are having preliminary plans prepared for the construction of a 12 story, 55 x 155 ft. garage at 617-21 South Hill St. J. and D. B. Parkinson, 808 Title Insurance Bldg., Archts.

Ill., Pekin—Fleishmann Co., will soon receive bids for the construction of a barrel storage building on Front St. Estimated cost $50,000.

Ill., Stickney—Sanitary District of Chicago, R. A. Woodhull, Chn. of Finance Committee, 910 South Michigan Ave., Chicago, awarded contract for the construction of railway and plant structures including locomotive terminal, repair building, transformer house, sludge control building, etc., for West Side Sewage Treatment Works, Pershing Rd. and South 52nd Ave., here. $595,966.

Ind., Hammond — Snodgrass Auto Co., will build a 100 x 125 ft. garage and service station at Calument St. and Standard Ave. Estimated cost $50,000. A. C. Berry, Archt.

Ind., Indianapolis — Mid-Continent Co., will soon award contract for the construction of a service station at Holly and Oliver Ave. Estimated cost $42,000. Bishop-Knowlton & Carson, 312 North Meridian St., Archts.

Ind., Indianapolis—Mid-West Corp., will soon award contract for the construction of a plant and machine shop at Pratt St. and Capitol Ave. Estimated cost $43,000. Bishop, Knowlton & Carson, 312 North Meridian St., Archts.

Kan., Wichita—Etchen Automobile Co., c/o F. R. Etchen, 1406 East Douglas Ave., awarded contract for the construction of a 2 story automobile sales and service building. Estimated cost $75,000.

Kan., Wichita—Kansas Gas & Electric Co., c/o J. H. LaGrant, Purch. Agt., 205A Sedgwick Bldg., will receive bids until Apr. 1 for the construction of a 1 story service building. C. V. Waddington, c/o owner, Archt.

Mass., Cambridge (Boston P. O.) — F. S. Webster Co., 340 Congress St., Boston, manufacturers of typewriter supplies, will soon receive bids for the construction of a 5 story factory and office at Wadsworth and Hatwood Sts. Estimated cost $40,000. Densmore, LeClear & Robbins, Park Sq. Bldg., Boston, Archts.

Mass., Chelsea (br. Boston) — Jenney Mfg. Co., 62 Indian St., Boston, awarded contract for the construction of a 2 story garage and repair shop on Marginal St. here. Estimated cost $40,000.

Mass., Malden (Boston P. O.)—Malden Machine Tool Co., 158 Exchange St., awarded contract for the construction of a 1 story, 60 x 100 ft. machine shop. Estimated cost $40,000.

Mo., St. Louis—Meyer Milling Co., Merchants Exchange Bldg., Third and Chestnut Sts., awarded contract for rebuilding trunk factory destroyed by fire at Eighth and Howard Sts. Estimated cost $15,000.

N. J., Camden—B. F. Sturtevant Co., Thorne and Copewood Sts., manufacturers of blowers, awarded contract for the construction of a 1 and 2 story, 100 x 260 and 40 x 100 ft. factory at Cremont St.

N. J., Clifton—Owner, c/o J. B. Caraoatter, 968 Bergenline Ave., Union City, had plans prepared for the construction of a 1 story garage, etc. here. Estimated cost $150,000. Architect not announced.

N. J., East Orange—Essex Co. Mortgage Co., 364 Main St., is having plans prepared for the construction of a 2 story garage, etc. at North Union Ave. and Commonwealth Pl. Estimated cost $150,000. W. F. Bower, 437 St., Archt. Noted Mar. 13.

N. J., Harrison—J. A. Finagan, 776 Broad St., Newark, Archt., will receive bids about May 1 for a 1 and 2 story factory for the manufacture of wire products for Driver-Harris Co., Middlesex St., Harrison. Estimated cost $250,000. Noted Feb. 20.

N. J., Newark — Newark Special Tool & Machine Co., 51 Lawrence St., will build a 1 story, 90 x 110 ft. factory at 87-95 St. Francis St. Estimated cost $40,000. M. B. Silberstein, 964 Broad St., Archt. Work will be done by separate contracts. Noted Mar. 13.

N. J., Newark—P. B. West, 24 Commerce St., Archt., will receive bids about Apr. 1, for the construction of a 2 story factory, etc. at Maple Pl. for General Alloy Co., 188 New Jersey Railroad Ave. Estimated cost $40,000.

N. J., Passaic—F. P. Friedman, 395 Springfield Ave., Newark, Archt., will receive bids about Apr. 1 for a 1 story, 140 x 150 ft. garage and repair shop here, for owner, c/o architect. Estimated cost $150,000. Noted Jan. 23.

N. Y., Brooklyn—G. Beinbrink, 1815 Gates Ave., is receiving bids for the construction of a garage at Gates and Seneca Aves. Estimated cost $40,000. L. V. Berger, 375 Fulton St., Archt.

N. Y., Brooklyn—M. Pope, 460 Sterling Pl., plans the construction of a garage on Rutland Rd. Estimated cost $40,000. J. T. Riggs, 717 Atlantic Ave., Archt.

N. Y., Buffalo—Buffalo Foundry & Machine Co., Fillmore Ave., received lowest bid for the construction of a 1 and 2 story, 103 x 137 ft. addition to machine shop at Fillmore and Ferry Sts. Reidpath & Wilson, Gerrans Bldg., Archts. Noted Mar. 13.

N. Y., New York—48th St. Studios Inc., 729 7th Ave., awarded contract for remodeling building at 318 East 48th St. into garage. Estimated cost $50,000. Noted Mar. 13.

O., Cleveland — Chain Products Co., F. G. Hodell, Pres. and Treas., 3924 Cooper Ave., awarded contract for a 1 and 2 story, 26 x 70 ft. factory. Estimated cost $40,000. Noted Feb. 6.

O., Cleveland—Huron Fireproofing Co., c/o D. Rothkeff, Guarantee Title Bldg., had plans prepared for the construction of a 5 story, 80 x 120 ft. garage at 634 Huron Rd. Estimated cost $200,000. A. Brett, 3259 Glencairn Rd., Archt. and Engr.

O., Cleveland — The Kroehler Mfg. Co., c/o J. O. Taylor, Const. Mgr., Fisher Bldg., Chicago, Ill., awarded contract for a 3 story, 79 x 200 ft. addition to furniture factory at East 116th St. and Harvard Ave., here. Estimated cost $200,000. Noted Mar. 6.

O., Cleveland—Oregon-Twenty-First Co., c/o H. M. Morse Co., Finance Bldg., Archt., had plans prepared for the construction of a 1 story, 70 x 100 ft. repair shop, etc. at East 21st St. and Rockwell Ave. Estimated cost $50,000.

O., Cleveland — Swift & Co., F. G. Secord, Mgr., 3241 West 65th St. (packers) are receiving bids for a 1 story, 60 x 120 ft. garage on West 65th St. Estimated cost $40,000.

O., Cleveland—Thompson Products Co., 2180 Clarkwood Rd., manufacturers of automobile parts, awarded contract for the construction of a 1 story, 123 x 126 ft. machine shop. Estimated cost $80,000.

O., Cleveland—Westinghouse Mfg. Co., 2209 Ashland Rd., plans addition to plating and galvanizing plant on West 58th St. Estimated cost to exceed $40,000. Private plans.

Pa., Altoona — Dixon Motor Co. Inc., F. Dixon, Mgr., 2507 Beale Ave., will build a 1 story, 120 x 225 ft. automobile truck factory at 8th and 9th Aves. Estimated cost $90,000. Private plans. Work will be done by day labor. Noted Jan. 23.

Pa., Altoona—Firestone Tire & Rubber Co., 1286 South Main St., Akron, O., awarded contract for the construction of a 1 story, 45 x 67 ft. automobile sales and service station here.

Pa., Butler—Castle Rubber Co., N. E. Brown, Secy. and Treas., Etna St., manufacturers of mechanical rubber products, awarded contract for a 1 story, 72 x 325 ft. plant, etc.

Pa., Donora — American Steel & Wire Co., Rockefeller Bldg., Cleveland, O., awarded contract for excavation and foundation work for mill including two rod mill buildings, billet storage, etc., here. Estimated cost $5,000,000. Noted Nov. 26.

Pa., Erie—General Electric Co., J. Wright, East Lake Rd., awarded contract for the construction of a 1 story, 75 x 225 ft. factory. Noted Feb. 27.

Pa., Norristown — The Wildman Mfg. Co., manufacturers of knitting machinery, awarded contract for the construction of a 1 story, 100 x 200 ft. factory. Estimated cost $200,000.

Pa., Philadelphia — Gimbel Bros., 9th and Market Sts., will soon award contract for the construction of a garage and service station. Abbott Merkt, 175 5th Ave., New York, N. Y., Archt. Noted Jan. 30.

Pa., Pittsburgh—Standard Auto Service Co., L. C. Thurber, Mgr., Manchester Blvd., awarded contract for the construction of a 1 story, 50 x 150 ft. garage and auto cleaning plant at 1600 West Liberty Ave.

Pa., Pittsburgh — Stroh Steel Process Co., W. Y. Stroh, Pres., 614 Westinghouse Bldg., plans the construction of a 132 x 264 ft. heavy castings foundry at Railroad Ave. and 32nd St. Private plans.

Pa., Tarentum—Tarentum Steel Co., V. Pres., 1716 First National Bank Bldg., Pittsburgh, will receive bids until Apr. 1, for excavation and foundation work for steel mill, here. Estimated cost $3,000,000. L. F. Galbraith, First National Bank Bldg., Pittsburgh, Engr.

R. I., Providence—Providence Cadillac Co., 9 Federal St., awarded contract for the construction of a 2 and 3 story, 125 x 215 ft. garage and repair shop, etc. Estimated cost $200,000. Noted Dec. 5.

Utah, Salt Lake City—Building Commission, University of Utah, will receive bids until Mar. 24 for the construction of a 4 story, 60 x 110 ft. engineering building. Estimated cost $100,000. Scott & Welsh, Dooly Bldg., Archts.

Va., Yorktown—Bureau of Yards & Docks, Navy Dpt., Washington, D. C., awarded contract for extension to shop at Navy Mine Depot, here. $67,400. Noted Feb. 20.

Wis., Milwaukee—Milwaukee Die Casting Co., 291 4th St., will receive bids about Apr. 1, for the construction of a 1 story, 380 x 470 ft. factory on Holton St. F. D. Chase Inc., 720 North Michigan Blvd., Chicago, Ill., Engrs.

Ont., Hamilton — B. H. and F. Prack, 36 James St. S., Archts., are receiving bids for the construction of a 2 story, 65 x 142 ft. factory on Gage Ave. for Hoover Mfg. Co. Ltd. (manufacturers of vacuum cleaners). Estimated cost $100,000.

Ont., Toronto — Dominion Automobile Ltd., awarded contract for the construction of a 3 story, 100 x 185 ft. garage on Bay St. Estimated cost $200,000.

Ont., Toronto — J. F. Raw Co. Ltd., 56 Adelaide St., E., manufacturers of surveying instruments, will soon award contract for for construction of a 5 story, 45 x 79 ft. blueprinting plant at Richmond and Church Sts. Estimated cost $150,000. M. Brown, Confederation Life Bldg., Archt. Noted Jan. 16.